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ABSTRACT

This guide offers a nutrition education program for students in Kindergarten through Grade 6. Activities span all grades as well as activities for the specific level. Nutrition education objectives are stated for each grade level: (1) grade four--students will explore how to balance food intake and energy output for overall health and physical fitness; (2) grade five--students will be motivated to eat nutritious foods because they understand why the human body needs certain nutrients to function; and (3) grade six--students will become motivated to conserve food and food-related resources. An explanation is given of what the students should understand about the objective for each level. The activities for Grade 6: (1) provide students with "hands-on" activities to learn about why and how much edible food is thrown away; (2) focus on the energy needed to produce, process, package, transport, and prepare food; and (3) explore the ecological consequences of food waste. A supplement to this guide contains worksheets, a letter for parents, and recipes. A Spanish translation of the letter for parents is provided. (JD)

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A Case of Waste

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NUTRITION COMES ALIVE

Nutrition Comes Alive

Level 6
A Case of Waste

Nutrition Educator's Guide

Written and Revised by
Tracy J. Farrell

Division of Nutritional Sciences, a division of the New York State College of Human Ecology and the New York State College of Agriculture and Life Sciences, Cornell University, Ithaca, New York 14853. 1986.

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Acknowledgments

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Martha C. Mapes
Coordinator, K–6 Revision
Division of Nutritional Sciences

Foreword

Why Nutrition Education

Our diets are shaped early in our lives by emotional, cultural, and social forces, as well as by the availability of certain foods. Traditions, food habits of parents and friends, and food advertising are some factors that influence American diets. Bombarded by numerous options, children should not be expected automatically to select nutritious foods. They must learn how to make nutritious choices from the array of foods available.

The ultimate goal of nutrition education is to provide knowledge and to foster skills that will promote nutritionally sound eating practices, which in turn contribute to an individual's nutritional well-being and overall health. Nutrition education should begin when children are young and in the process of developing their eating habits. Early positive experiences with nutritious foods help create a foundation for lifelong eating habits, nutritional awareness, and attitudes that facilitate good health.

Preface

Developing Thinking Skills

For children to develop good habits for nutritional well-being, we must help them learn to make intelligent food choices. Making intelligent choices depends on their ability to analyze and evaluate foods within the context of their world, which includes fast-food restaurants, vending machines, and convenience foods. Rather than ignore the influence of such modern-day phenomena, we must teach children to evaluate the foods available from such sources so they can make appropriate selections. As stated by Isobel Contento, Teachers College, Columbia University:

> Today's consumer or learner needs, on the cognitive level, to know how to select from the vast array of foods in the average supermarket those foods he or she needs for optimal health in today's context. He or she also needs to know how to be discriminating about dietary advice that comes, sought and unsought, from a variety of unequally reliable sources such as popular books, advertising, packaging labels, newspapers, and materials from food industry sources or "health" food stores.
>
> On an affective level, the learner needs to learn self restraint—particularly in light of the sedentary life-styles of most Americans, and to develop attitudes toward food selection that are conducive to long-term health.*

Developing the thinking skills of our students seems the most effective way to proceed. If we use practical examples to help students sort out the choices available and identify various nutritional options, we are helping them face this complex world of food and eating. Therefore it would seem more important for students to be able to differentiate between opinion and fact when viewing advertisements than to be able to recite the nutrients in a given food. It may be more important for them to be able to search out and decipher the key nutritional information on a label than to name food groups important to health. If overnutrition is a problem involving excess fat, sugar, salt, or total calories, students need to be able to think about how to make modifications in food choices and ingredients within their own family and cultural traditions.

In other words, the focus of teaching should shift from transferring information to the student to processing information by the student; at least, we should strive for a better balance. Teachers can help provide practical situations so students can practice using their thinking skills to take increasing personal responsibility for their food choices. This curriculum guide is offered as a way to help make this goal possible.

*Isobel Contento, "Thinking about Nutrition Education: What to Teach, How to Teach It, and What to Measure," ***Teachers College Record*** 81 (Summer 1980): 422–23.

Overview of Nutrition Education, Grades 4–6

For each grade level one major nutrition objective is supported by several understandings. The suggested activities and work sheets are intended to help students achieve the understandings and objectives.

Grade Level	Objectives/Understandings
Grade 4	Objective: Students will explore how to balance food intake and energy output for overall health and physical fitness. Understandings: 1. Energy is needed for all life processes. 2. Three nutrients in food provide our bodies with energy for daily living and activity. 3. Changes in eating patterns and exercise levels resulting from technological changes affect a person's ability to maintain energy balance.
Grade 5	Objective: Students will be motivated to eat nutritious foods because they understand why the human body needs certain nutrients to function. Understandings: 1. Human beings, like all living things, are composed of microscopic cells. 2. All cells need nutrients for energy, growth, maintenance, and repair, and these nutrients come from food. 3. As food is digested by the body, nutrients are released and carried by the blood to the waiting cells.
Grade 6	Objective: Students will become motivated to conserve food and food-related resources. Understandings: 1. Food is wasted at home, in school, and throughout the community. 2. Much energy is required to produce, process, package, transport, and prepare food. 3. Sensible use of food and food-related resources can help protect our environment.

Nutrition Comes Alive

A Practical Classroom Tool

Nutrition Comes Alive is a nutrition education program developed by the Division of Nutritional Sciences, Cornell University, for elementary school students in grades K through 6. The guide for each grade level contains information relevant to the entire age span as well as activities for the specific level. The material for each grade level is intended to help you provide students with a multitude of learning opportunities. The activities, designed to stimulate student interest, are presented in an appealing, easy-to-use format. Special features of the guides are detailed below.

Integrates Activities

A key feature of the materials is that they may by integrated with other established academic subjects. Nutrition does not have to be taught as an isolated subject. It is a recognized part of most science, health, and social studies textbooks. The upper right-hand corner of each activity sheet indicates the subject area into which the activities best fit, for example, language arts, math, social studies, science, music and art, or health and fitness. Check through the activity sheets before planning your schedule so you will know what activities best integrate with other subjects.

Focuses on Today's Concerns

With changes in lifestyles and eating patterns over the past fifty years, Americans are more likely to be affected by dietary excesses than by deficiencies.To help children make wise food choices within the context of our modern society, nutrition education must include current nutrition-related health concerns. Consequently, the material in the guides reflects such contemporary issues as the selection of nutritious snacks, the importance of physical activity for fitness, the desirability of limiting dietary intake of fat, sugar, salt, and calories, and the need to reduce the waste of food and food-related resources to protect our environment.

Provides Flexibility

The guides encourage flexibility and creativity in the classroom. They are not a prescription for teaching. Instead, a wide range of possible activities is presented so that you can select and structure learning experiences to meet the needs of your students. You may schedule nutrition education activities throughout the school year or introduce them as units.

Promotes Active Learning

The materials engage students in active learning. Such "hands-on" activities as testing lung capacity, constructing a three-dimensional food tube, creating a mini-landfill, practicing first aid techniques, and probing into food waste habits in the school, home, and community all stimulate learning by directly involving students.

Participating in these activities gives students a chance to think, feel, and act. The activities for grades 4 through 6 foster critical thinking and challenge students to investigate ideas ranging from the mystery of microscopic cells to considering environmental problems concerning energy.

Includes Motivators

Special motivators such as science experiments, puzzles, crafting an apple head doll, improvisations, and tasting new foods entice students to learn about nutrition. These exciting activities will appeal to students on both affective and cognitive levels.

Evaluates Learning

Like other components of the school curriculum, nutrition education must be evaluated to determine whether the desired outcomes have been produced. It is not easy to evaluate whether the goal of promoting behavior that fosters good health has been achieved. How students apply knowledge to nutrition and health-related issues is even more important than their increase in knowledge. Therefore, whenever possible, the evaluation should include ways to measure changes in underlying attitudes and in behavior. To facilitate this evaluation, the teaching materials in the nutrition education guides provide various tools for monitoring students' nutrition learning.

Observation: Observing students in the classroom enables you to evaluate changes in their behavior. For example, are students less likely to throw away nutritious foods during the lunch hour after they have studied food waste? Do individuals gravitate to the science materials and seem curious about exploring them? Are students eager to use their math skills to figure how many Calories are provided by the protein, fat, and carbohydrate in a given food?

Verbal Wrap-Up: Students should summarize in their own words what they learned from a particular lesson. Can they explain the importance of food energy and why too much food energy may be as much of a problem as too little? Can they tell you why exercise might be a key to health? After learning about the chemicals in food can they discuss the pros and cons of using preservatives or artificial sweeteners? Such a wrap-up gives students a sense of accomplishment and helps them remember key points.

Application of Learning: You can ask students to apply their knowledge or skills in new situations. After learning to read labels, they could be asked to evaluate several products and select the food lowest in fat or the cereal with the least sugar. Can they use their class knowledge to plan a bag lunch, a class campout, or snacks for younger children? Do they demonstrate ability to use the apparatus and keep careful records while doing science activities?

Repetition: Repeating certain classroom activities or work sheets will show whether students have changed their attitudes or values about particular issues. After studying food waste, do students indicate any changes in attitude about conservation of food and food-related resources? After participating in the mock congressional hearing activity, are students able to separate facts and opinions about sugar?

Parent Feedback: By participating in conferences, parents can provide additional evaluation information. Do parents report that their children are more conscious of the need for active exercise?

Have the children started to read labels or take more interest in what they eat at meals? After using dental disclosing tablets in class, are the children more careful about brushing their teeth? Are children more conscious of poisons in the home and have they posted the poison control number near the telephone? Have they asked where local landfills are located? Such informal information can help you judge whether the nutrition program had a desirable effect.

Encourages Parent Involvement

New ideas in any subject are always learned better if they are reinforced in the "real world." Home and family are important parts of a child's world. Parents have a strong interest in their children's health and growth, and parents also control what foods are available in the home. By working together, parents and teachers can double their impact on children's eating practices.

You can encourage parents to participate in many different classroom activities. For example, cooking activities and science experiments usually run more smoothly when an extra adult helps. Or a parent with special expertise might talk to the class or demonstrate a skill. Parents can also be invited to attend open houses or special events or to go on class trips.

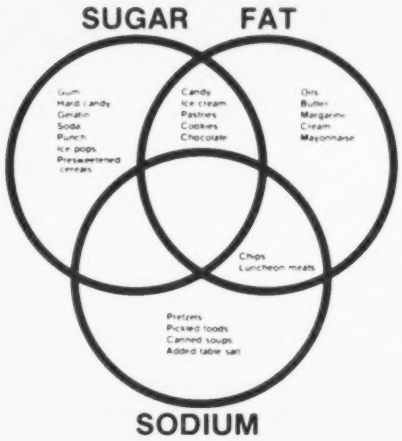
Another way to involve parents is by making a special effort to let them know what is happening in the classroom. You can share information about your class nutrition projects, and students can take home their work sheets, recipes, snack information, and letters that are included in the units.

Encourages Food-Service Involvement

The food-service personnel in your school may assist you with different food-related activities. They may be able to provide ingredients, equipment, utensils, and advice about foods and cooking safety. If you want any special help from food-service personnel, be sure to plan ahead so you can ask them well in advance of the time you need their help.

Ask your food-service staff to give the class a tour of the kitchen, or ask whether a class cooking activity could be done in the kitchen. Be sure to involve your food-service manager in your planning for a food waste study at school so it can be a positive experience for everyone. Cooperation between the classroom and cafeteria can maximize their impact on children's food habits.

Some Key Nutrition Issues



Sugar

Sugars are natural components of some foods. Fruits and some vegetables contain sugars, along with important vitamins, minerals, and fiber. Unlike fruits and vegetables, however, many food products contain large amounts of added sugar (sucrose, dextrose, honey, fructose) and contribute little more than kilocalories. When these "empty-calorie" foods and beverages replace more nutritious choices, getting enough nutrients without too many calories may be a problem. Even the increasing use of artificial sweeteners does not solve the problem of soft drinks replacing a more nutritious choice such as milk. Foods such as sugared milk products, ice cream, custards, and puddings can be considered "good" in moderation because they contain protein and calcium. But eating too many sugary products may contribute to obesity and is a major factor in tooth decay.

Dental Health

Not only are dental problems widespread in the United States, but professional dental care is expensive. Therefore it is important to begin good diet and health habits early in life.

Sugar (sucrose) is the preferred food of cavity-causing oral bacteria. When sugar is available, the bacteria eat it, forming acid. The acid weakens the tooth structure and promotes tooth decay. More critical than the amount of sugar ingested at any one time are the frequency and duration that sugar is available to oral bacteria.

Sugary snacks are of particular concern because they increase the frequency of exposure to sugar and may also increase the duration of exposure. For example, soft drinks that are sipped and sticky candies that adhere to the tooth surface keep sugar available to oral bacteria for extended periods of time, especially if they are eaten as snacks. When sweets are eaten with meals, other foods tend to buffer the acid formed and also assist in removing sugar from the teeth.

Fats

Fats provide kilocalories and essential fatty acids. But only a small amount of dietary fat supplies all the essential fatty acids. A recent concern is that Americans derive too many of their daily kilocalories from fat. Not only may this high fat consumption lead to obesity, but one class of fats appears to be an important factor in heart disease.

Studies have shown that saturated fat, found mainly in animal products, tends to contribute to heart disease, whereas unsaturated fat may not. Cholesterol, a substance found only in animal fat, has been implicated in heart disease. The primary source of unsaturated fat is safflower, sunflower, corn, and soybean oils. Coconut and palm oils contain higher amounts of saturated fats.

In light of these findings, it has been suggested that people decrease the amount of saturated fat they eat. It has been further recommended that Americans decrease their total fat consumption from the present level of about 40 percent of total calories to 30 percent.

Sodium

Hypertension or high blood pressure can be a nutrition-related health problem. Large intakes of sodium, mostly in the form of common table salt, are implicated in causing high blood pressure in susceptible persons. Lowering sodium intake and achieving reasonable weight help control hypertension.

Many advertised snack foods are very high in sodium. Potato chips, salted pretzels, and some crackers are examples of high-sodium foods. It is encouraging that new low-sodium forms of these favorite snacks are now on the market. Canned vegetables without added salt and low-salt cheeses are also now available. Cutting down on sodium is one way to build better food patterns for the future.

Iron-Deficiency Anemia

A recent survey found that 61 percent of children in the United States were receiving less than the recommended dietary allowance for iron. A continual low iron intake increases children's risk of developing iron-deficiency anemia.

Anemia is caused by a lack of dietary iron needed to form hemoglobin, a compound in the blood that carries oxygen to the cells. Symptoms of anemia include fatigue, weakness, irritability, and pallor.

Meat, poultry, dried beans, and dark green vegetables can help meet the iron requirement. In addition, unsweetened fortified cereals, whole-grain and enriched breads, and dried fruits are iron-rich foods that make appealing snacks. Because vitamin C increases the absorption of iron, citrus fruits and juices are good companions to high-iron meals and snacks.

Calcium Concern

Bone health is a key concern of both youth and adults. Interest has always focused on supplying necessary calcium and vitamin D for the formation of bone in growing infants and children. Increasing concern about osteoporosis has caused us to search out information about maintaining bone health during our mature years.

Our bones are in a state of constant flux, serving as banks in which calcium can be deposited and withdrawn. Although 99 percent of the body's calcium is in the bone, the other 1 percent circulates in the blood and is vitally important for normal nerve transmission, muscle contraction, heart function, and blood clotting. When this small but critical amount falls below a certain concentration, the bones release some of their calcium.

Low intake of calcium-rich foods during the adult years compromises bone health. Adults need calcium just as much as growing children do. Prolonged deficiency of calcium through the adult years may increase the risk of osteoporosis, a disease seen particularly in postmenopausal women and characterized by weak and fragile bones.

Since bone mass reaches its maximum when a person is about the age of 35 and declines as part of the aging process thereafter, people of all ages need to be aware of their intake of milk and such other sources of calcium as leafy green vegetables, broccoli, and fish with edible bones such as sardines, canned salmon, and fresh smelt.

Because calcium is important throughout life, students should establish habits of calcium consumption that they will follow throughout their lives.

Obesity

Obesity is a major health problem in the United States today, for both adults and children. Why is excessive weight a health concern? In adults, the prevalence of diabetes, hypertension (high blood pressure), and atherosclerosis (heart disease) increases with obesity. The concern for children is that obesity will persist into adulthood and result in health problems. Overweight or obese children also may be troubled by emotional and social problems.

What can be done? All children can be encouraged to be very active all year round. Extra attention should be paid to children with weight problems, to be sure that they find an activity they can do and enjoy—and that they continue to do it. Parents and children should learn about the problems of overeating. Good habits can be developed early. Many families are concerned about wasting food at the dinner table. Food waste, however, starts in purchasing and preparation. A good eater is a moderate eater, not a big eater.

Energy Balance

Kilocalories (energy) are needed to support life and growth. Eating too few kilocalories can result in poor health and, in children, can limit growth. Eating more kilocalories than required, however, can also result in poor health. Overweight, and especially obesity, can increase the risk of developing many health problems. The number of kilocalories that a person needs for health depends on the amount of energy that he or she uses for basic body processes and for physical activity.

Carbohydrates, proteins, fats, and alcohol are the food components that give us kilocalories. Carbohydrates, proteins, and fats are essential nutrients; alcohol is not. But there are other essential nutrients that we must eat to be healthy: minerals, vitamins, and water. Although these nutrients do not supply kilocalories, they can be found in many foods that do. Each class of nutrients is important for a variety of body functions. Therefore, the foods in our daily diet must be carefully selected to supply all the essential nutrients without exceeding our kilocalorie requirements.

Energy = **Kilocalories**

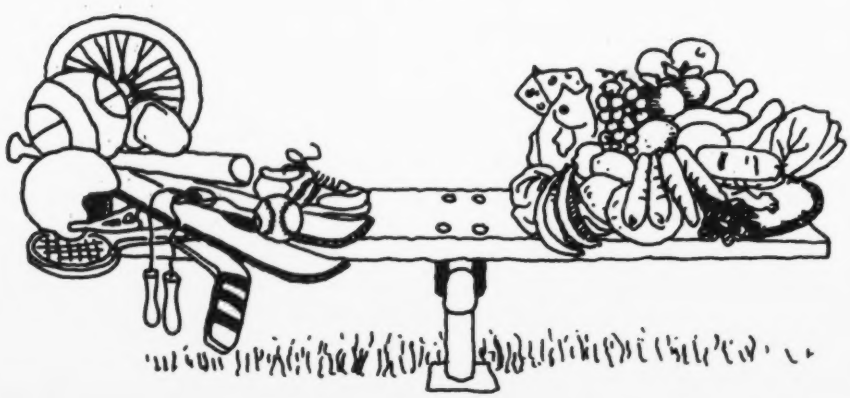
Kilocalories = **Calories**

The energy value of a food is expressed as a unit of heat. A kilocalorie (kcal) is the amount of heat required to raise the temperature of one kilogram of water one degree Celsius. Another way to think of this amount of energy or heat is to realize that one large apple, which contains about 100 kcal, provides enough heat to raise the temperature of slightly over four cups of water from 0 degrees C (freezing) to 100 degrees C (boiling). Four and a half cups of shredded cabbage or one tablespoon of peanut butter has a similar energy potential.

Kilocalorie (kcal) is the unit of energy we should use when we talk about the energy value of food. A kilocalorie is 1000 calories. The term *calorie* is often mistakenly used to represent the energy value of foods, but kilocalorie is the correct scientific term. For example, a glass of whole milk contains 165,000 calories. We omit the zeros and use the word *kilocalories,* with the understanding that *kilo* stands for those zeros. Another way to indicate kilocalories is to use *Calories* spelled with a capital *C.* Thus, one glass of milk has 165 kilocalories or 165 Calories. In Levels 4 to 6 of **Nutrition Comes Alive** the energy values of foods and activities are expressed as Calories rather than kilocalories.

Snacks—A Nutritional Plus or Minus?

Many people tend to think of between-meal snacks as "junk" or "empty-Calorie" food, but it is not necessarily true. The problem is that candies, soft drinks, cookies, and potato chips are often eaten exclusively for snacks in place of nutritious foods. These foods offer few nutrients but are loaded with Calories. By learning to choose snacks carefully, children can avoid overly sweet or salty and high-fat snacks in favor of more nutritious fruits, vegetables, grain products, and milk. Well-chosen snacks can make a substantial contribution to the nutritional quality of children's diets.



Fiber

The dietary fiber in our diets is not just one compound but a grouping of many complex carbohydrates found in cell walls of plants. These include cellulose, hemicellulose, and pectins as well as lignin, which is not a carbohydrate. In simple terms, dietary fiber refers to polymeric components of plant cells that your body does not digest and absorb.

Most nutritionists agree that dietary fiber is very important, but many of the benefits that have been claimed have not been proved. At the present time, the most clearly established benefit of dietary fiber is that it helps to relieve or prevent constipation. There is evidence that it is beneficial in preventing or treating diverticular disease. It has also been suggested that fiber may reduce the risk of cancer of the colon and heart disease and help control diabetes and obesity. Some of the effects may be indirect in that a diet higher in fiber will contain less fat and protein.

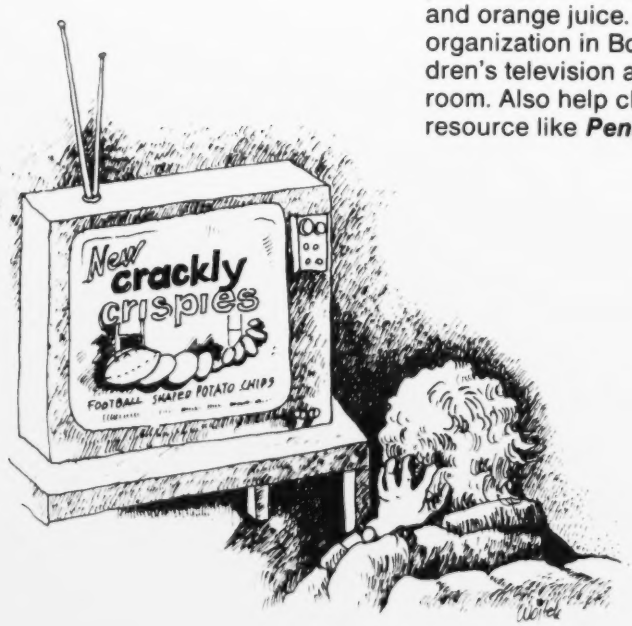
But although fiber is important in the diet, just because some is good, a lot is not necessarily better. Large doses of purified fiber may increase the excretion of some minerals, but it is unlikely that a mineral deficiency will develop if moderate amounts of fiber are eaten as part of a normal diet.

The best advice is to increase dietary fiber by eating more fresh fruits and vegetables, whole-grain bread and cereal products, beans, and nuts. With this approach you are not likely to consume excess fiber and you will get a variety of types of fiber, each of which might have a different benefit. In addition, these foods supply vitamins and minerals.

Children and Food Advertisements

Every day we are bombarded by food ads through newspapers, magazines, direct-mail ads, radio, and, of course, television. Children watch an average of 27.5 hours of television per week and more than 20,000 commercials per year. It has been estimated that 60 percent of all commercials aimed at children are for food, and, unfortunately, the majority are for nonnutritious foods and food products. With this exposure, the food ads undoubtedly have a tremendous impact on the way children think about food. It is not a simple problem to deal with, but with guidance from parents and teachers, children can learn to question what they see on television and become aware of the selling intent of ads.

Repeated positive advertising is needed to complement nutrition education. Encourage local TV affiliates to increase their use of paid and public service announcements that support healthy foods such as milk and orange juice. Support the Action for Children's Television (ACT) organization in Boston, Massachusetts, in its effort to improve children's television and consider using ACT teaching tools in the classroom. Also help children to become wise consumers by using a good resource like ***Penny Power*** magazine.

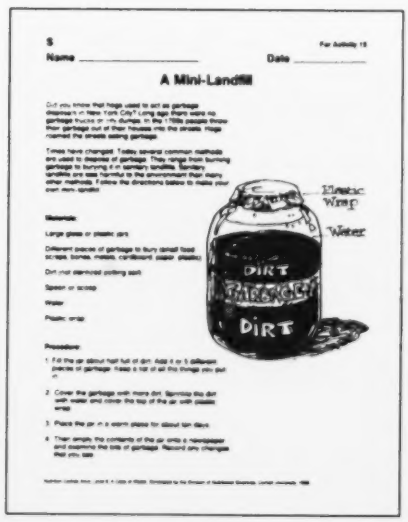


Nutrition Educator's Guide

Objective for Level 6

Students will become motivated to conserve food and food-related resources.

Using *A Case of Waste*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Name _____ Date _____

A Mini-Landfill

Did you know that Nagy used to act as garbage disposal in New York City? Long ago there were no garbage trucks or city dumps. In the 1700s people threw their garbage out of their houses into the streets. Hogs roamed the streets eating garbage.

Times have changed. Today several common methods are used to dispose of garbage. They range from burning garbage to burying it in sanitary landfills. Sanitary landfills are less harmful to the environment than many other methods. Follow the directions below to make your own mini-landfill!

Materials

Large glass or plastic jar

Different pieces of garbage to bury (small food scraps, bones, metals, cardboard, paper, plastic)

Dirt (not chemical potting soil)

Spoon or scoop

Water

Plastic wrap

Procedure

1. Fill the jar about half full of dirt. Add 4 or 5 different pieces of garbage. Keep a list of all the things you put in.
2. Cover the garbage with more dirt. Sprinkle the dirt with water and cover the top of the jar with plastic wrap.
3. Place the jar in a warm place for about ten days.
4. Then empty the contents of the jar onto a newspaper and examine the kind of garbage. Record any changes that you see.

Plastic Wrap
Water
DIRT
GARBAGE
DIRT

Unit Overview

Is food waste a problem in your school and community? Can food waste be reduced? How are the waste of food and energy related? What are the environmental consequences of food waste? How can we best conserve food and food-related resources? These are among the issues raised in ***A Case of Waste***. Discovering the magnitude, causes, and consequences of food waste through a variety of thought-provoking activities will help motivate students to conserve food and food-related resources.

Nutrition Educator's Guide

A Case of Waste contains three sections. The understanding for each section is listed on the section divider.

In Section 1, "Waste All Around," students conduct "hands-on" activities in school and in the community to learn how much edible food is thrown away and why. Section 2, "Energy Ins and Outs," focuses on the energy needed to produce, process, package, transport, and prepare food. When edible food is discarded, all of this energy is wasted. Finally, in Section 3, "Down in the Dumps," students will explore the ecological consequences of food waste.

To help you plan for each lesson, a section at the top of each teacher activity sheet tells what advance preparation is needed. Work sheets used in that lesson's activities are listed as well as films to order, books to borrow, and materials to assemble.

Integration

Each of the nutrition activities may be integrated into other academic subject areas as noted on the teacher activity sheets. Activities were coordinated with the sixth grade curriculum of New York State. For more ideas on how to integrate nutrition learning into other subjects, refer to the specific curricula for science, math, health, social studies, language arts, and home and career skills.

Student Work Sheets

A Case of Waste contains work sheets and information sheets that you can photocopy or make into dittos for distribution to the class. Suggestions for using these work sheets are found on the teacher activity sheets. The work sheets are contained in a separate booklet.

Resources

Any books, films, or slide sets needed for a particular activity are noted under "Advance Preparation" on the teacher activity sheets. More complete information about the resources is listed on the back of the appropriate section dividers or in the general resources section.

Letter to Parents

To help involve parents in their children's learning, ***A Case of Waste*** includes a letter than can be copied and sent home with the children. The letter gives parents information about activities that are taking place in the classroom and invites their participation.

Evaluation

The final activity sheet in each section contains suggestions to help you evaluate student learning. Helping students verbalize and demonstrate what they have learned is vital.

Food Waste and Hunger

Students may want to contrast the problems of food waste and hunger. If people in the United States waste less food, will there be more food available for hungry people in this and other countries? The question is not easily answered. Shortages of food are affected by the interaction of many factors including politics, economics, agriculture, and geography. Conservation of food does not necessarily mean that more food will get to those who need it. Nonetheless, an exploration of food waste may make students want to learn more about the problem of hunger.

The pamphlet ***Food Waste as an Individual Concern*** (General Resources) may be used to begin a discussion of food shortages and hunger. Students may probe the problem of hunger by researching the causes of food shortages in another country. Are these shortages affected by the waste of food in the United States? How might this problem be solved?

General Resources

Books and Pamphlets

Nutrition Concepts and Controversies. E. M. Hamilton, E. N. Whitney, and F. S. Sizer. St. Paul, MN: West Publishing Company. 3d ed. 1985.

This introductory textbook presents basic nutrition concepts and current issues in an easy-to-read, personal style. Many informative tables, charts, and drawings are included within each chapter. Each chapter concludes with an in-depth discussion of a controversial issue such as diet and heart disease, diets for athletes, and the effect of sugar on children's behavior. An extensive appendix includes a table of food composition and many additional facts.

Jane Brody's Nutrition Book. J. Brody. New York: Bantam Books. 1982.

Written for the general public, this book provides information on a number of current issues in nutrition. The dietary guidelines, cholesterol, fiber, sugar, food additives, food labels, sodium, fad diets, and fast-food eating are among the many topics discussed in 27 chapters.

Nutritive Value of Foods. Home and Garden bulletin 72. U.S. Department of Agriculture. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Revised 1985.

This bulletin contains nutritive values of commonly used foods. Values for fat, fatty acids, cholesterol, carbohydrate, calcium, phosphorus, iron, potassium, vitamin A, thiamin, riboflavin, niacin, ascorbic acid, and sodium are included.

Food Waste as an Individual Concern. M. Mapes and B. Stewart. Available from Cornell University, Distribution Center-C, 7 Research Park, Ithaca, NY 14850.

This study guide, designed to serve the needs of schools, community groups, and individuals who are concerned about food and energy waste, raises questions about food waste and its implications for world hunger.

Energy: Our Food and Our Needs. Produced by Susan Travis and Barbara Fry. Revised by Susan Travis. 1984. Division of Nutritional Sciences, Cornell University. Available for sale or rent from Cornell University Audio-Visual Center, 8 Research Park, Ithaca, NY 14850.

This three-part Cornell Cooperative Extension slide set covers foods high in energy nutrients; use of carbohydrates, fat, and protein within the body; individual energy needs; effects of imbalanced intakes of carbohydrates, fat, and protein; practical application of dietary guidelines; and a reminder that alcohol provides calories but no nutrients.

Nutrition Education Specialists

Cornell Cooperative Extension. Addresses of local offices are listed in Appendix 1.

Adult and 4-H agents, serving as professional home economists at the county level, are part of Cornell Cooperative Extension statewide and work closely with faculty and staff in the Division of Nutritional Sciences at Cornell University to promote nutrition and health.

Youth programming includes a large 4-H youth development effort, a part of which is work with teachers in the schools. **Nutrition Comes Alive,** K–6, and **Make Up Your Mind about Alcohol,** 5–6, are two special nutrition resources developed by Cornell Cooperative Extension for school use.

Consult your local Cornell Cooperative Extension office for details about workshops and current resources.

National Dairy Council. Addresses of local offices in New York State are listed in Appendix 2.

The National Dairy Council offers extensive and excellent nutrition education resources for the classroom. Reference to its annual catalog will help you select appropriate resources to match the ability levels of your students.

New York State Education Department. Bureau of Health and Drug Education and Services.

The Nutrition Education and Training Program (NET) is currently organized into three regions in New York State. Services under NET include assistance in the development of nutrition education programs and services; training workshops for administrators, teachers, and school food service staff; and development and distribution of nutrition resource materials. Addresses of regional offices are listed in Appendix 2.

Food Education Resources

New York Agriculture in the Classroom. Developed by the Department of Education, Cornell University, 1986.

In the fall of 1987 the **New York Agriculture in the Classroom** program will have curriculum materials to teach required subject matter using accurate agricultural examples. Production, processing, distribution, and retailing of food and fiber will be the focus of units in science, social studies, mathematics, and language arts. Contact your county Cornell Cooperative Extension 4-H program for information.

Note: Specific resources needed for activities in each section are listed on the back of the appropriate section dividers. You may need to order films well in advance of when they are needed.

Section 1

A Case of Waste

Waste All Around

Understanding:

Food is wasted at home, in school, and throughout the community.

Before You Start

Think about what has gone into the wastebaskets in your community today—papers, packaging of all kinds, and food. With today's technology, throwing things away seems to be an inevitable part of daily living. But is it? Is it necessary for each American to discard 3.5 pounds of trash every day?

Our vision of early American life is one of thrift and frugality. People kept animals, for example, not only for food, but for provision of clothes, candles, and other goods as well. Many materials were saved and reused in new ways, such as scraps of worn clothing pieced together into lovely warm quilts.

But as technology and abundance increased, waste of many materials also increased. Americans are now less conservation-conscious than their ancestors were. With the extensive use of plastics, individual packaging, and disposable products, much that was formerly used is now discarded. Food waste is part of this cultural phenomenon.

How much food is wasted in your school and community? Why? Can anything be done to reduce this waste? Students will find the answers to these questions as they complete the activities in this section. Collecting information on food waste in school, in the community, and at home will stimulate students' interest in the subject and provide a multitude of interdisciplinary learning experiences, which may help motivate students to conserve food.

To make the exploration of waste most meaningful, be sure to involve your school principal and food-service personnel as well as parents and community members.

Activities	Subject
1. What Is Waste?	Home and Career Skills, Social Studies, Math, Language Arts
2. Waste in School or Home	Home and Career Skills, Science, Math, Social Studies
3. Spotlight on Waste	Home and Career Skills, Social Studies, Math
4. Nutritious Garbage	Home and Career Skills, Science
5. Likes and Dislikes	Home and Career Skills, Math
6. Will It Go to Waist?	Home and Career Skills, Math, Health
7. Evaluation	

Section 1

A Case of Waste

Resources

Trash Tells a Tale. Available from Audiovisual Resource Center, 8 Research Park, Cornell University, Ithaca, NY 14850, or from Cooperative Extension (see Appendix 1 for address of local office.)

This 48-slide set with audiotape and script is an ideal motivator to begin the study of food waste. Your class will be astounded to learn how much food researchers found in the garbage cans of Tucson, Arizona. And studies by a sixth grade class in New Hartford, New York, will inspire your students to explore food waste in your community and school.

"Food Waste Behavior in an Urban Population." G. Harrison et al. ***Journal of Nutrition Education*** 7, No. 1 (1975):13.

The article explains the methodology and findings of the "garbologists" who studied urban waste in Tucson, Arizona.

Food Comparison Cards. Available from the Dairy Council (see Appendix 2 for address of local office.)

Based on the U.S. Recommended Dietary Allowances, colorful bar graphs show the nutrient profiles of 60 different foods.

Promoting School Lunch: Creative Ideas for School Food Service. Available from Regional Health and Nutrition Coordinators for New York State (see Appendix 2 for addresses of coordinators).

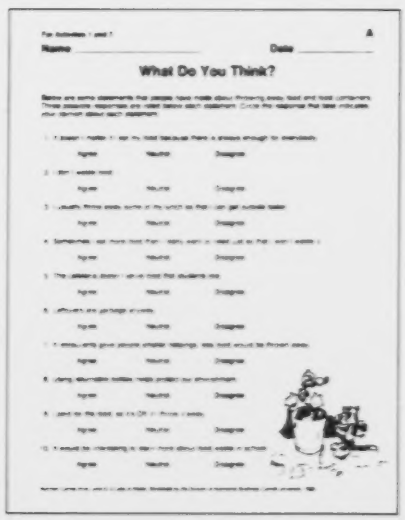
A set of ten packets, one for each month of the school year, contains poster, menu suggestions, and practical ideas to make school lunches more lively and exciting.

What Is Waste?

Advance Preparation

Copy work sheet A for each student.

Obtain the slide set ***Trash Tells a Tale*** (Resources, Section 1) or copy information sheets B for each student.



A

Name _____ Date _____

What Do You Think?

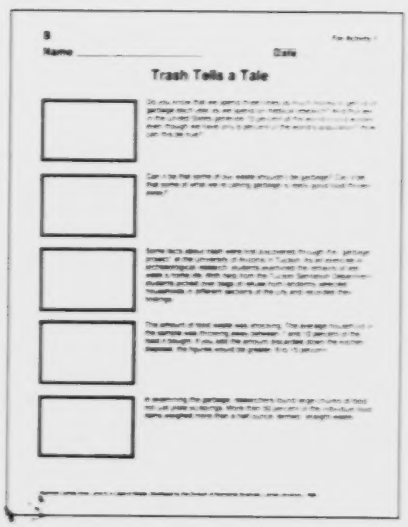
Below are some statements that people have made about throwing away food and food containers. Three possible responses are listed below each statement. Circle the response that best indicates your opinion about each statement.

1. It doesn't matter if I eat my food because there's always enough for everybody.
   Agree Neutral Disagree
2. I don't waste food.
   Agree Neutral Disagree
3. Usually, throw away some of my lunch so that I can get outside faster.
   Agree Neutral Disagree
4. Sometimes, I eat more food than I really want or need just so that I won't waste it.
   Agree Neutral Disagree
5. The cafeteria doesn't serve most the students like.
   Agree Neutral Disagree
6. Leftovers are garbage at once.
   Agree Neutral Disagree
7. I enjoy eating good balanced meals, and food around the dinner table.
   Agree Neutral Disagree
8. Using information leaflets helps prepare our shopping list.
   Agree Neutral Disagree
9. I plan to the food, so I'm OK if there's waste.
   Agree Neutral Disagree
10. It would be interesting to learn more about food waste in school.
    Agree Neutral Disagree

Name one more word to add to these sentences to make them complete. Write your answer on the line.

Throw-Away Society

Explain that in our fast-paced technological society we often discard items that were once saved and reused. Some people feel that our casual "throw-away" attitudes lead to the waste of large amounts of valuable materials and energy. Food waste is a part of this cultural phenomenon.



B

Name _____ Date _____

Trash Tells a Tale

Do you know that we spend more time in front of the TV than we do in the garbage can? Or that we spend an hour a day in the garbage can? Or that we spend an hour a day in the garbage can? Or that we spend an hour a day in the garbage can? Even though we spend only a few minutes a day in the garbage can, this can be true!

Can you tell what some of our waste amounts to be garbage? Can you tell some of what we're putting garbage in every good trash these days?

Some facts about trash were first discovered through the garbage project at the University of Arizona. In an ongoing set of archaeological research, students examined the contents of one week's home site. Work here from the Tucson Sanitation Department, students pulled over bags of refuse from apartments, urban and households in different sections of the city and recorded their findings.

The amount of food waste was shocking. The average household in the sample was throwing away between ___ and ___ percent of the food it bought. If you add the amount recycled, down the kitchen disposal, the figures would be greater. It is ___ percent.

In examining the garbage, researchers found large amounts of food not yet eaten or leftovers. More than ___ percent of the individual food items weighed more than a half ounce, perhaps enough waste.

Name one more word to add to these sentences to make them complete. Write your answer on the line.

Questions for discussion:

—Name some utensils, implements, gadgets, or other items that are thrown away after limited use.
(Plastic cutlery, paper plates and cups, pens, napkins, paper towels, lighters, flashlights, glass bottles.)

—What are the advantages and disadvantages of using disposable rather than more permanent items?

—Think whether you threw away any foods or parts of foods during the past 24 hours and list them on a piece of paper. Then ask yourself why you threw them away. Could you have found a use for this food?

—How would you define food "waste"?
(Usually "waste" is considered to be chunks of edible food rather than small scraps, peels, bones, or shells.)

(continued)

—Why do you think we waste food? (We have an abundance of food; it takes less time to throw away food than to save it; we don't know how long we can keep food and have it still be safe to eat or how to use items like stale bread or overripe fruit; we don't feel that saving food is important; we may not even be conscious that we waste food.)

—How can we prevent food waste? (Buy and cook only as much as we can eat in the immediate future; store food properly to keep it fresh. Point out that eating everything on your plate even if you are not hungry is not a remedy for the problem of food waste. Eating more than your body needs for health is another form of food waste because the excess Calories are transformed into unhealthy body fat. This concept is covered in Activity 6.)

What Do You Think?

Give each student a copy of work sheet A. Ask students to indicate their opinions about each statement. Explain that the statements are controversial and that people may have different opinions.

Have a few students collect the work sheets and tabulate the number of "agree," "neutral," or "disagree" responses to each statement. Students can calculate the percentages of different responses and make bar graphs to illustrate them.

If for some questions opinions are evenly divided between pro and con students can stage debates or write persuasive essays to support their viewpoints.

Collect and save the work sheets for evaluation in Activity 7.

Trash Tells a Tale

Present the slide set ***Trash Tells a Tale,*** or, if you cannot obtain the slide set, distribute information sheets B, which summarize the main points from the slide set.

To find out more about the garbage project at the University of Arizona, obtain "Food Waste Behavior in an Urban Population" (Resources, Section 1) and read it to the class.

Questions for conversation:

—What kinds and amounts of food did the Tucson investigators find in the garbage?

—How did a sixth grade class in New York find out about food waste in their school?

—What foods do you think are wasted in our school?

—Could our class do a similar study?

The class may use Activity 2 or 3 to find out more about food waste in their school, home, or community.

Additional Activities

Ideas for Waste Reduction

Divide the class into three or four teams. Have each team think of as many ways as possible to decrease personal waste of food at home and school. Compile a list of the best ideas to share with parents and other classes.

Waste in School or Home

Advance Preparation

Copy letter C to parents for each student.

Copy school waste study and work sheets D, E, and F for each student.

(Alternative: Copy home waste work sheets G and bring one plastic garbage bag for each student.)

It is essential to secure the support, understanding, and help of your school's food-service staff and principal before you begin this activity.

Conducting a Study

After watching ***Trash Tells a Tale*** or reading the information sheets students may want to learn more about food waste, and school is a natural place to begin. Conducting a study of food waste in school gives students an opportunity to analyze the waste of food from lunches brought from home as well as food purchased from the cafeteria, school store, or vending machine. Such a study requires a high level of student involvement and incorporates math, science, social studies, language arts, and home and career skills subject matter. If it is not possible for your class to conduct an extensive study, you may use Activity 3 to organize "mini-investigations" of food waste.

It is important to realize that food waste is common in our country. The cafeteria is chosen as the site for a study because it is easily accessible, not because it is at the center of the food waste problem. Wherever people eat there is waste, and such a study can help us learn the reasons why.

Letter to Parents

To share information about the unit on food waste, and to invite parent participation, distribute copies of letter C for students to take home. A study of food waste at school or at home may require parental approval. Furthermore, parents may be interested in helping with the explorations.

Organization

There are many ways to organize a study. Your class may use the guidelines provided on work sheet D or develop another format. Help students organize a study by discussing the following questions:

—What do you hope to learn from your study?

—What questions about food waste do you need to ask?

—Will you include all the students in the school or use a smaller sample?

—If you choose a sample, how will you be sure it is a fair sample?

—How long will your study be?

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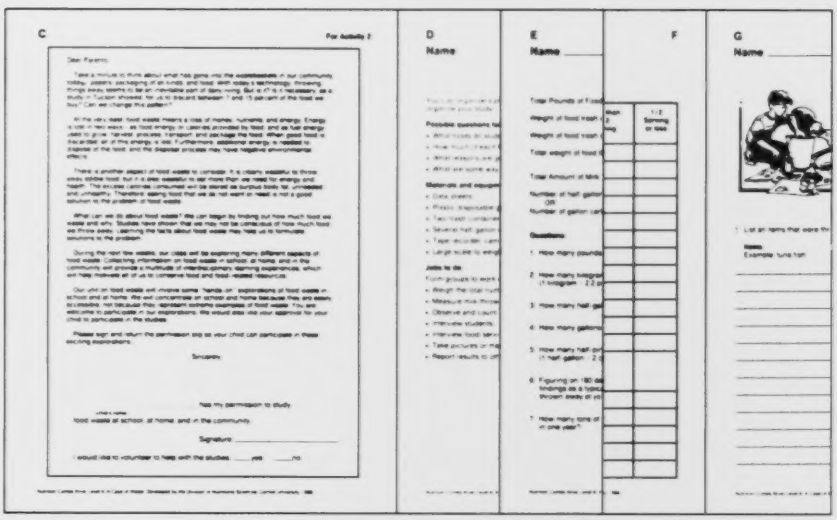

—How will you protect the privacy of people you observe during the study?

—Do you have the support and cooperation of the principal and the food-service director and staff?

—Is it necessary to arrange schedules so that you can be in the cafeteria for several lunch periods?

Distribute the waste study sheets D, E, and F. Discuss and modify them as necessary. Help students divide into committees, organize their tasks, and collect materials for the study.

View from the Kitchen

Students often complain that "the food is garbage anyway" and blame the food-service personnel for food waste in the cafeteria. Undertaking a well-planned study challenges students to learn why so much food is wasted in the school cafeteria. It offers an opportunity to talk with the food-service manager and better understand the complex regulations and constraints that affect the service of food in the school. The food-service supervisor can explain to students how government regulations, price policies, staffing patterns, and availability of kitchen equipment all influence what foods are served in the cafeteria. When students' limited food likes clash with food-service regulations and policies, the result may be food waste.

Results

After completing the study students can present the results to other students, parents, food-service personnel, the Parent Teacher Association, or even the Board of Education. Students may have specific suggestions about how to decrease waste at school.

Students and staff members in other schools have used some of the following ideas to decrease food waste.

—Students set up a "share table" in the cafeteria where anyone may deposit such unwanted food items as an unopened carton of milk or a piece of fruit. Other students can then select and eat those foods, which might otherwise be thrown away.

—Students worked with the food-service personnel to develop alternatives to the usual hot lunch menu. Some schools now offer nutritious salad or sandwich bars as alternatives to the hot lunch.

—Students joined an advisory committee to help food-service personnel evaluate meals and plan changes.

—School administrators changed the schedule so that recess preceded lunch. They found that students were more relaxed at lunch and less likely to throw away food and milk.

Save the results of the study of school waste to use in Activity 4, when students will calculate the nutrient loss when food is wasted.

Alternative Study of Home Waste

If necessary, individual studies of waste at home may be substituted for the study of waste at school. Be sure to inform parents about this study and obtain their permission. Distribute copies of work sheet G to help students plan and organize a study of food waste in their homes. Also give each student a plastic garbage bag to use for the study.

Ask students to report on the extent to which food waste appears to be a problem in their homes. Do all members of the family consider waste a problem? What does the family define as "waste"—food left on plates, food trimmed before preparation, stale hamburger buns, or food spoiled in the refrigerator? What different ideas do family members have for solving the problem?

Additional Activity

Controversial Vendors

Students might explore the use of vending machines in school and other buildings. What food items are sold in vending machines? How do choices at the vending machine affect choices in the cafeteria? Are food purchases from vending machines related to food waste in the cafeteria?

Spotlight on Waste

Advance Preparation

Copy work sheet H for each student.

Obtain approval of the school principal, parents, and any other community members who will be involved.

Borrow tape recorders and cameras to record observations (optional).

Can You Find a Case of Waste?

Students can conduct "mini-investigations" to explore sources of food waste in the community. As they look for wasted food they will also find trash from food packaging, a problem closely related to waste of food. (The question of packaging will be more thoroughly explored in sections 2 and 3.)

This activity is called a mini-investigation because it is an alternative to Activity 2, which provides a more thorough opportunity to explore food waste at school or at home. You may choose to use either the mini-investigation or the more extensive projects.

Ask students to list all the places in your community where they think that food is wasted. Their list might include schools, homes, grocery stores, parks, streets and sidewalks, beaches, factories, restaurants, and hospitals. Ask why they think that food is wasted in these places. Is food waste a problem? Can it be reduced?

Mini-Investigations

Distribute work sheet H. Review the ideas for investigations listed on the sheet. Determine which exploration sites would be appropriate in your community and develop additional ideas if needed. Select sites that are easily accessible to students.

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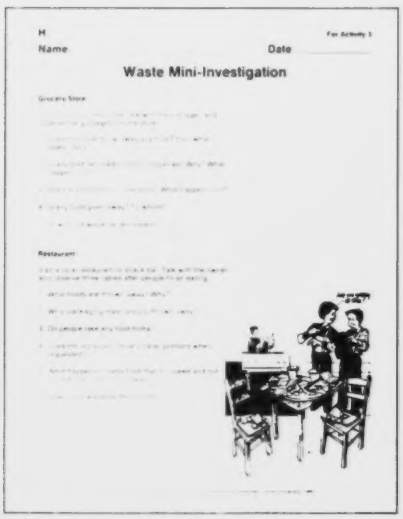

H
Name Date
Waste Mini-Investigation

Divide the class into several small groups. Help the groups plan their investigations and decide how to record their results. Some groups may want to design forms on which to record their observations. Students may need special permission from parents, the principal, and community members before they begin investigations outside of school. You may also want to invite parent or community volunteers to work with each group. Students should plan to spend two or three hours outside of school collecting information.

Students should carefully plan where they will look and what they will look for. They should be polite and considerate of others during investigations. They should also make appointments when necessary. If they visit a business, they should be sure not to disrupt it. They should also be sure to protect the privacy of anyone observed during the investigations.

After students have collected and organized the information from their investigations they can report their findings to the rest of the class. Discussion might include the following questions:

—What did you learn from your investigation?

—Are there any cases of waste in our community?

—Do you have some ideas about how to decrease food waste in our community?

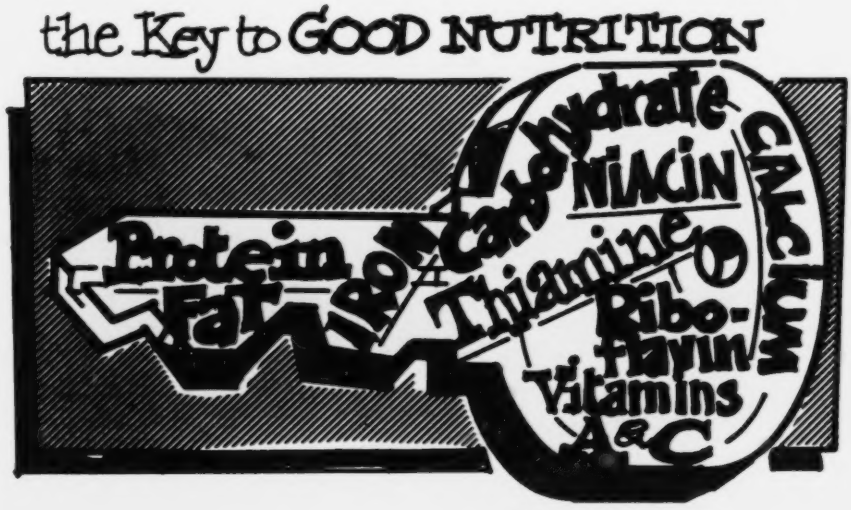
—Would it be possible for someone to try using your ideas?

Additional Activity

From Garden to Garbage

Have students write creative stories centering around a piece of edible food that was discarded. Where did it come from? Where did it go? What happened to it? Why was it discarded? How did it feel?

Nutritious Garbage

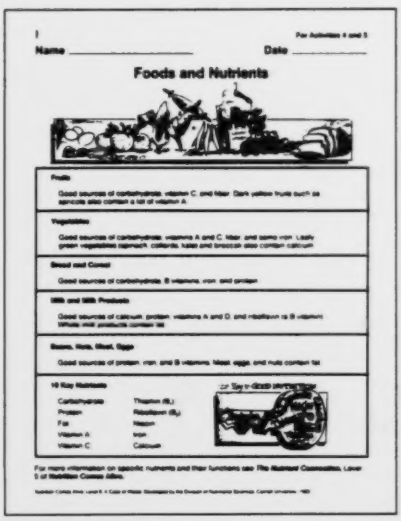


Advance Preparation

Copy information sheet I for each student. This sheet will also be used in Activity 5.

Bring information from the study of food waste in school in Activity 2 or from the mini-investigations in Activity 3 to analyze.

Obtain a copy of ***Nutritive Value of Foods*** (General Resources) (optional).


I For Activities 4 and 5

Name _____ Date _____

Foods and Nutrients

Orange Energy

As a warm-up activity, have nine students each run in place for one minute. This activity represents the food energy, or Calories, supplied by a small orange. It will help students visualize the amount of food energy that would be wasted if an edible orange were thrown away. (In Section 2, students will also consider the amount of energy that is needed to produce, process, store, and transport food.)

Key Nutrients

Distribute information sheet I. Review the key nutrients and the foods that provide them. Point out that nutrients are wasted whenever edible food is discarded.

Different foods provide varying amounts of the more than 50 essential nutrients that are used for energy, for regulation of body processes, and for growth, maintenance, and repair of body tissues. If the ten key nutrients listed on information sheet I are consumed in adequate amounts, it is likely that most other necessary nutrients are also consumed in adequate amounts.

Divide the class into five groups and assign each group two key nutrients. Have students look at the information collected during Activity 2 or Activity 3 to find out whether foods high in particular key nutrients were frequently discarded. More information on the nutrient content of specific foods may be found in ***Nutritive Value of Foods.***

Have each group report its findings to the class. Which nutrients were most often wasted? What are some ways to reduce the waste of particular nutrients? (Suggestions might include substituting more popular foods that provide the same nutrient or preparing foods in ways that would appeal to more students.)

Government nutrition studies have found that the nutrients most likely to be lacking in the diets of American children are calcium, iron, and vitamins A and C. Did your students find that foods high in these four nutrients were often thrown away?

(continued)

Students may do additional library research on the key nutrients to find out why they are important for health. More information on specific nutrients may be found in **The Nutrient Connection,** Level 5 of **Nutrition Comes Alive,** or in ***Nutrition Concepts and Controversies*** or ***Jane Brody's Nutrition Book*** (General Resources).

Have students save information sheet I to use in Activity 5.

Additional Activities

A Nutritious Party

Help students plan a key nutrient party. Small groups of students can prepare snacks that are good sources of calcium, iron, vitamin A, and vitamin C. Be sure to have enough so that everyone can taste each snack.

Nutrient Profiles

Use the Dairy Council's Food Comparison Cards (Resources, Section 1) to compare the nutrient profiles of popular foods. Students can see what nutrients are wasted if the foods are discarded.

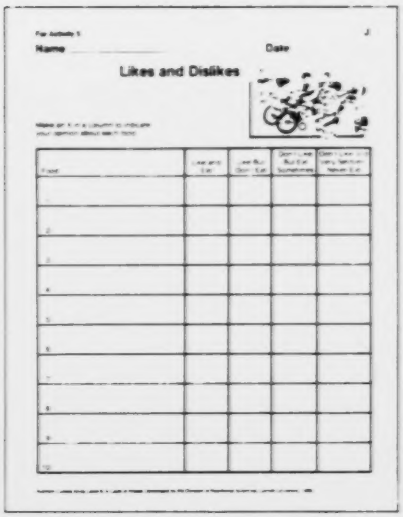
Likes and Dislikes

Advance Preparation

Copy work sheet J for each student.

Have students bring information sheet I that was used in Activity 4.

Obtain a copy of ***Nutritive Value of Foods*** (General Resources) (optional).



Likes and Dislikes

Name _____ Date _____

Favorite Foods

Ask each student to write the name of a favorite food on a piece of paper, then to list the reasons why he/she likes the food. Among the reasons might be that the food tastes good, is eaten on special occasions, is fun to eat, friends like it, and so on.

Have students tell the class what some of their favorite foods are and reasons for liking them. If several students like the same foods, do they have the same reasons for liking them?

Point out that many factors affect food preferences and eating habits, including the availability of certain foods, family practices, culture, the influence of friends, advertising, and taste preferences. These same factors are partly responsible for food waste. For example, someone may like spaghetti the way it is fixed at home but not at a friend's home. Someone else may be reluctant to eat broccoli if her friends don't eat it or if she has never tasted it before.

Lunchtime Popularity

Distribute work sheet J. Then ask the class to compose a list of ten foods that are commonly served in the cafeteria. They should include some favorites and some that are less well liked. Students may want to consult a school lunch menu as they make up this list. Each student should list all the foods on his or her paper. Students should then indicate whether they like and eat, like but don't eat, don't like but eat sometimes, or don't like and seldom or never eat, each food listed.

When they have filled in the blanks for all the different foods, ask them to circle any foods they have thrown away at lunch recently.

(continued)

Have groups of students tabulate and record the results on the chalkboard. Results can be shown as fractions, percentages, or bar graphs. After viewing the results, discuss some of the following questions:

—Which foods are best liked? Least liked? Are any foods universally liked or disliked?

—Are disliked foods thrown away and wasted more often than liked foods?

—What other reasons besides actually disliking a food would a person have for throwing it away? (Desire to get to the playground faster, friends don't eat it, never tasted it before, food is spoiled, don't feel well, cooked differently than at home, and so on. Researchers in New York State found that scheduling playtime before rather than after lunch significantly decreased the amount of food that students threw away.)

Have students use information sheet I to determine what nutrients are contained in the ten foods. More information on the nutrient content of specific foods may be found in ***Nutritive Value of Foods.*** What nutrients are wasted when each of the ten foods is thrown away?

Let the school food-service director and staff know the results of the survey. Offer to work with them to design menus and to taste-test recipes. Your school food-service director may want to obtain the merchandising modules entitled **Promoting School Lunch: Creative Ideas for School Food Service** (Resources, Section 1).

Additional Activities

Survey Foods Eaten at Home

Repeat this activity using foods eaten at home. Then compare the results of the two surveys.

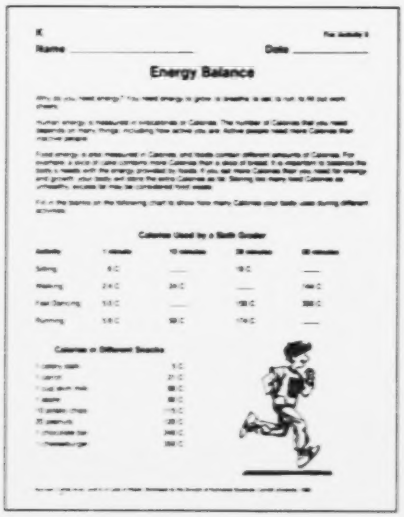
Survey Bag Lunches

Determine which foods from home-bagged lunches are most popular. Are any foods particularly likely to nourish the garbage cans?

Will It Go to Waist?

Advance Preparation

Copy work sheets K for each student.



K

Name _____ Date _____

Energy Balance

Why do you need energy? You need energy to grow, to breathe, to eat, to run, to do your work at school.

Human energy is measured in kilocalories or Calories. The number of Calories that you need depends on many things, including how active you are. Active people need more Calories than inactive people.

Food energy, also measured in Calories, and foods contain different amounts of Calories. For example, a slice of cake contains more Calories than a slice of bread. It is important to balance the body's needs with the energy provided by foods. If you eat more Calories than you need for energy and growth, your body will store the extra Calories as fat. Storing too many fixed Calories as unhealthy excess fat may be considered food waste.

Fill in the blanks on the following chart to show how many Calories your body uses during different activities.

Calories Used by a Sixth Grader

Activity	1 minute	10 minutes	30 minutes	60 minutes
Sitting	1.0 C	____	30 C	____
Walking	3.4 C	34 C	____	204 C
Fast Dancing	5.0 C	____	150 C	300 C
Running	5.8 C	58 C	174 C	____

Calories in Different Snacks

1 celery stalk	5 C
1 carrot	21 C
1 cup skim milk	86 C
1 apple	80 C
10 potato chips	115 C
20 peanuts	120 C
1 chocolate bar	240 C
1 cheeseburger	350 C

Energy Balance

Reinforce the idea that food provides energy for our bodies. We need energy for all body processes such as the beating of our hearts and breathing. We need additional energy for activities such as running, dancing, or walking. The energy we get from food is measured in kilocalories (commonly called calories).

Kilocalorie is the unit of energy we mean when we say "calorie." A kilocalorie is 1000 calories. The term "calorie" is often mistakenly used to represent the energy value of foods, but kilocalorie is the more precise term. For example, a glass of whole milk contains 165,000 calories. We remove the zeros and say 165 kilocalories, with the understanding that "kilocalories" indicates those zeros. Another word for kilocalories is Calories, with a capital C. In this unit, the energy values of foods and activities will be written as Calories rather than kilocalories.

Earlier activities have involved the discarding or waste of edible food and various reasons for this waste. Now students will consider another aspect of food waste—the relationship between food waste and energy expenditure.

Questions for discussion:

—What happens if you eat more food than your body needs for energy and activities?
(You feel sick, feel too full, get fat.)

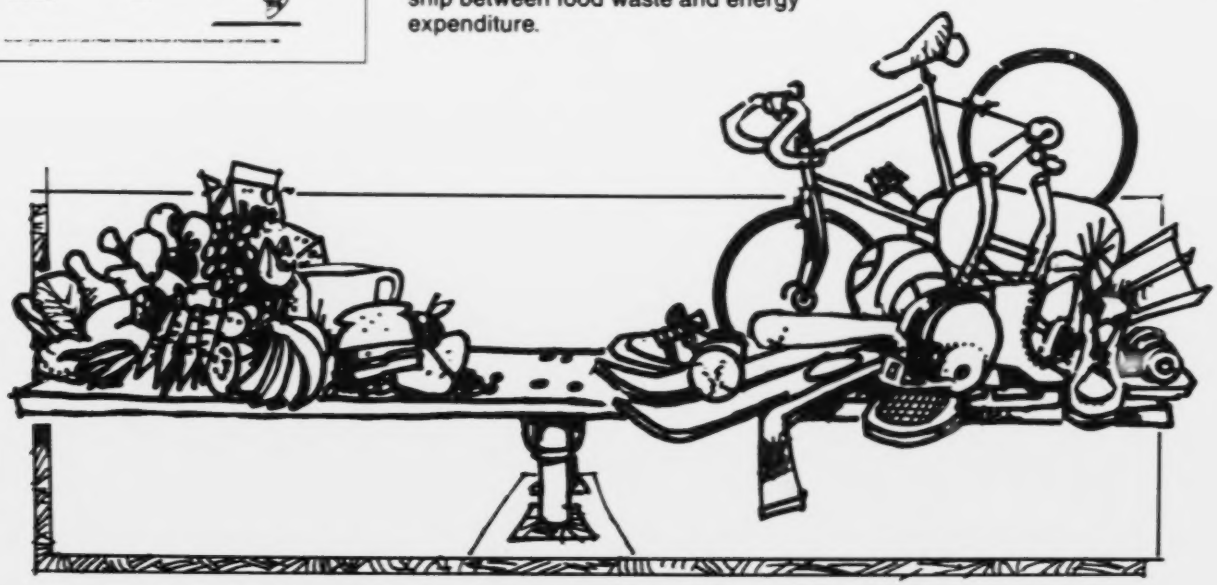
—Why might you eat more food than your body needs?
(Habit, nervous, happy or unhappy, pressure from friends or family.)

—What can you do to help balance your food intake with your energy use?

—What about the "clean plate club"? Is it always desirable to eat everything on your plate? Why or why not? What are some other ways to avoid wasting edible food?
(Take smaller portions, cook smaller amounts, buy less food.)

Explain that eating more than is needed for health can also be considered food waste. The food is wasted when its Calories are transformed into unhealthy excess body fat. These surplus Calories often

(continued)



come from "junk foods" rather than from more nutritious foods. "Junk foods" provide many Calories but few other nutrients. To avoid obesity and maintain health, it is necessary to balance Caloric intake with Caloric requirements.

Distribute work sheet K. Have the class complete the chart and answer the questions.

Answer key: Chart: sitting 10 min.—6 Cal.; sitting 60 min.—36 Cal.; walking 30 min.—72 Cal; fast dancing 10 min.—50 Cal.; running 60 min.—348 Cal. Questions: (1) celery, carrot; (2) 133.3 minutes, 16 minutes; (3) 20.7 minutes; (4) chocolate bar, cheeseburger, potato chips, peanuts

Take Time to Exercise

Recent studies have shown that many elementary school students are not physically fit. You may want to work with the physical education teacher to determine your students' levels of fitness. Then develop a routine to help students increase their activity levels and become more physically fit.

Have students determine how many hours they usually spend watching television each day. Can they plan to substitute more "active" activities for at least half of their television watching time?

With students, develop a list of favorite activities that use a lot of energy. Ideas may include jogging; playing tag or relay games; playing basketball, soccer, field hockey, or lacrosse; dancing; roller or ice skating; and jumping rope. Encourage students to participate in these activities during recess or after school.

One benefit of exercise is that our bodies tend to keep using energy at an accelerated rate even when we stop moving. That is why people who exercise regularly can usually eat heartily without worrying about gaining weight.

An Exercise Trail

As a special physical fitness activity, work with students to develop a class exercise trail in the school gym or on the playground. An exercise trail is a route with several exercise stations. Each station has a sign illustrating and explaining a particular exercise. A station may be a clear area in which to perform an exercise, or it may provide an exercise prop such as a log to jump over.

Participants complete the exercises at their own pace and are free to skip or repeat any of them. Each station may prescribe three levels of exercise: for beginners, intermediates, and champions. The trail begins with warm-up exercises, followed by more challenging ones, and concludes with a cool-down series.

The class exercise trail might be temporary or permanent for the use of a single class or the entire school. After deciding which exercises to include on their trail, students can make signs to explain and illustrate each exercise.

Some exercises that might be included along the trail are toe touches, jumping jacks, and broad jumps. Playground and gymnasium equipment could be incorporated into the trail. For example, students could slide down a slide at one station or jump rope at another.

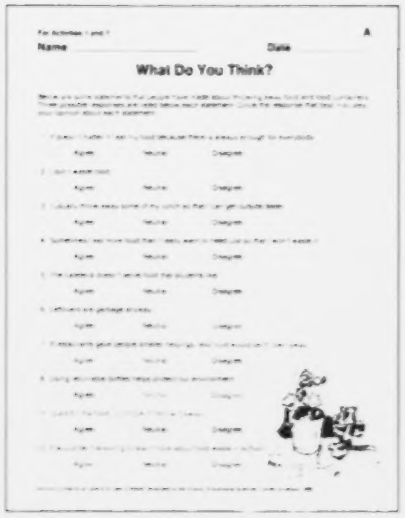
Check with local colleges, fitness centers, or community organizations to see if they have an exercise trail that students could use.

Evaluation

Advance Preparation

Copy work sheet A for each student.

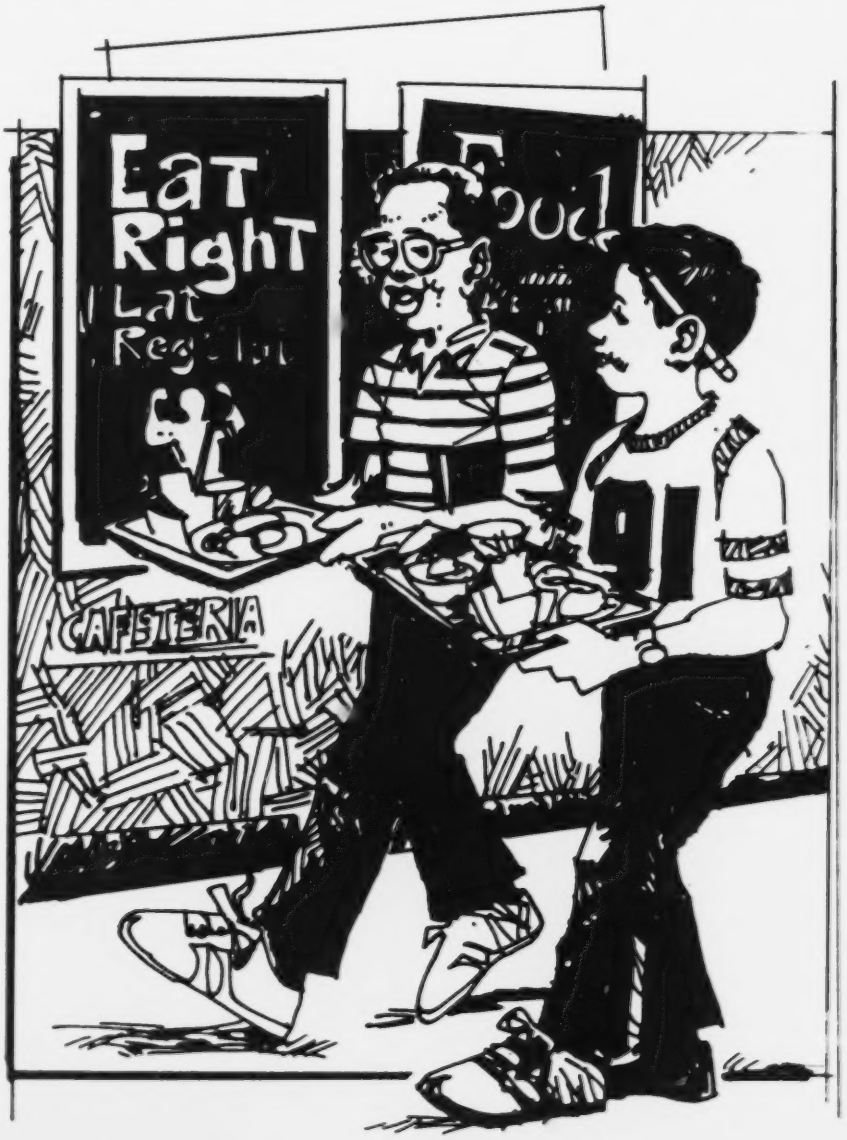
Bring original work sheet A that students completed in Activity 1.



Name _____ Date _____

A

What Do You Think?



Any Changes?

Give each student a second copy of work sheet A. After they have completed the opinon survey on the work sheet, distribute their original work sheets and have them compare their responses to their original responses. Did their responses indicate any changes in attitude about conservation of food and food-related resources? Ask them to give reasons for any changes.

Campaign to Stop Waste

Have students use the information gathered during Activities 2 or 3 to plan a schoolwide effort to decrease food waste. After conducting the campaign, students can observe whether food waste in the cafeteria has decreased.

What Was Learned?

Ask students to list five interesting facts or concepts that they learned from the activities in Section 1.

Section 2

A Case of Waste

Energy Ins and Outs

Understanding:

Much energy is required to produce, process, package, transport, and prepare food.

Before You Start

Students learn about the food chain in science classes. In the natural food chain, energy is transferred from the sun to green plants, from plants to animals, and from animals to other animals. Some energy is lost at each step of the chain.

Today's food system uses far more energy than does the natural food chain because it involves processing, packaging, and transporting food long distances as well as storing and preparing it in the home. Like the food chain of nature, each step in the extended or man-made chain consumes energy. In 1980 every Calorie of food energy produced in the United States required an average energy input of approximately 9 Calories.

In this section students will learn about the energy used to get food from field to table. The activities will help motivate students to conserve food and energy.

Activities	Subject
8. Let the Sun Shine	Science
9. The Food Chain Lengthens	Science, Home and Career Skills
10. The Food Travelers	Social Studies, Language Arts
11. Food Packages	Math
12. Energy Use at Home	Home and Career Skills, Language Arts
13. Evaluation	

Section 2

A Case of Waste

Resources

Chains, Webs, and Pyramids: The Flow of Energy in Nature. L. Pringle and J. Adkins. New York: Crowell, 1975.

This book explains how energy flows through nature's food chains and webs.

Dining on a Sunbeam: Food Chains and Food Webs. P. S. Busch. New York: Four Winds Press, 1973.

This book describes natural food chains and webs and traces the source of their energy.

Food, Energy, and Society. D. and M. Pimental. London: Edward Arnold, 1979.

The interdependencies of food and energy and their impacts on society are explored as the authors review many different food production systems and the way they use energy.

Energy, Food, and You. Available from Washington State Office of Environmental Education, NW, c/o Shoreline District Offices, NE 158th and 20th Avenue NE, Seattle, WA, 98155.

An interdisciplinary curriculum guide for elementary schools, ***Energy, Food, and You*** contains a plethora of activities related to food and energy. Different activities are appropriate for children ranging from kindergarten to grade six.

Food: Where Nutrition, Politics, and Culture Meet. D. Katz and M. Goodwin. 1976. Distributed by Center for Science in the Public Interest, 1755 S Street, NW, Washington, DC 20009.

This book is full of instructive activities related to all aspects of food. The sections on food and energy are especially relevant.

It's Your Move. S. Travis. Division of Nutritional Sciences. Available from Media Services Printing, B–10 MVR Hall, Cornell University, Ithaca, NY 14853.

"Farm Production and Food," one unit in this seven-unit program, includes activities that will help students identify and learn about the steps in the food chain and examine how these steps affect our food choices.

"How Your Food Gets to You." F. Powledge. ***New York*** magazine, June 13, 1983.

The hustle and bustle of New York City's largest wholesale markets are portrayed in this fascinating article.

Earth Friends Program. Nutrition Education Resources Project, Box 188, Teachers College, Columbia University, New York, NY 10027.

This food and environmental education program was designed to help children choose healthy and ecologically responsible diets. "Earth Friends" are defined as people who make food choices that are sound not only for their own health but for the health of the world as well.

How Do They Package It? G. Sullivan. Philadelphia: Westminster Press, 1976.

Full of interesting facts and anecdotes, this book details the development and history of various food packages.

Let the Sun Shine

Advance Preparation

If necessary, refer to an explanation of food chains in a science textbook or in ***Chains, Webs, and Pyramids*** or ***Dining on a Sunbeam*** (Resources, Section 2).

Sunny Beginnings

Refer to a school lunch menu and record on the chalkboard all the foods listed for two or three days.

Questions for discussion:

—Which foods give your body energy and nutrients?
(All of them.)

—Did the foods come from plants or animals? Separate the foods into two lists, those from animals and those from plants.
(Many foods are combinations of plant and animal products. You will need to examine the individual components of combination foods.)

—What percentage of the foods come from plants? What percentage from animals?

—Where did each of the foods get its energy?
(Green plants capture solar energy from the sun and through a process called photosynthesis create their own stored food energy consisting of carbohydrates, protein, and fat. Animals cannot make their own energy, so they must eat plants or other animals.)

—What is the ultimate source of all our food energy?
(The sun.)

Explain that we call the transfer of energy from sun to plant to animal a "food chain." Students may be familiar with the concept of food chains from science classes. Draw the following illustration on the chalkboard to show how a food chain works.

Sun → Green Plants → Animals → Humans
(Low) (High)

At each step on the chain the plant or animal uses energy to maintain itself. Any additional energy is stored in plant or animal tissues. The more steps, or links, a food chain has, the more energy is lost along the way. The farther along, or higher, in a food chain a food is, the more natural energy is needed to produce it. For example, it takes more energy to produce a pork chop than an ear of corn.

(continued)

Some natural food chains are very simple, for example, sun→plants and seeds→mouse→fox. Because humans eat a great variety of foods, our position in the food chain is more complex. We may eat foods that are higher and lower in different food chains or even in the same ones.

Divide the class into several small groups. Have each group choose a few of the foods that were listed on the chalkboard and illustrate possible food chains for them. Students should place themselves as final links in the chains. Chains might look like the drawings below.

After the groups have finished, ask questions such as the following:

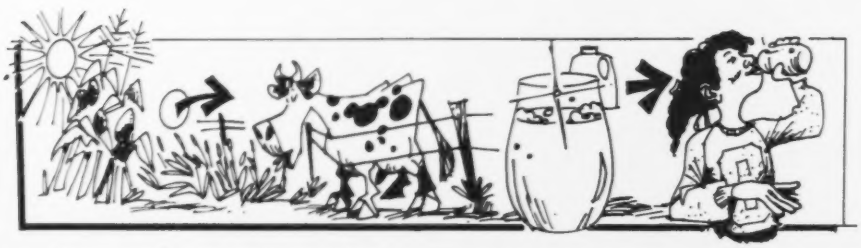
—What foods are higher and what ones are lower on food chains?
(In general, all plant products are lower than all animal products.)

—Did anyone illustrate a food chain that shows an animal that ate an animal?
(Tuna fish eat smaller fish; chickens may eat insects or worms.)

—If a person wanted to eat foods that are lower on food chains, what foods could she or he choose?
(Eat more foods from plants, less from animals.)

More to the Story

The relationship of energy to food would be simple if it were explained entirely by food chains. Our food supply is so complex, however, that the natural food chain is just the beginning of the story. Almost all of our food is processed, packaged, transported, and prepared to some extent before we eat it, and all of these steps use additional energy. In the next activity, students will examine the extended food chains that consume additional energy.



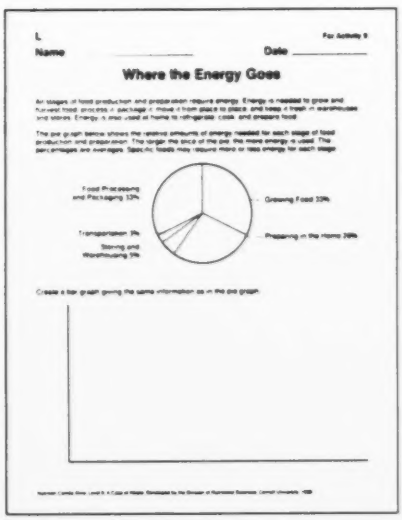
Sun → Grass and Grains → Cow (milk) → Us

Sun → Tomato (tomato sauce) → Us

The Food Chain Lengthens

Advance Preparation

Copy work sheet L for each student.



L

For Activity 9

Name _____ Date _____

Where the Energy Goes

An images of food production and preparation require energy. Energy is needed to grow and harvest food, process it, package it, move it from place to place, and keep it fresh in warehouses and stores. Energy is also used at home to refrigerate, cook, and prepare food.

The pie graph below shows the relative amounts of energy needed for each stage of food production and preparation. The larger the slice of the pie, the more energy is used. The percentages are averages. Specific foods may require more or less energy for each stage.

Food Processing and Packaging 33%

Growing Food 33%

Transportation 3%

Storing and Warehousing 3%

Preparing in the Home 28%

Create a bar graph giving the same information as in the pie graph.

Human Ecology Unit, Level II © Copyright Reserved to the Board of Vocational Education, Carroll University, 1981

Where the Energy Goes

Ask each student to name a favorite food. List the foods on the chalkboard. Questions for conversation:

—Which foods are eaten in the same form as they come from the field? Which have been changed or processed in some way?
(An apple is eaten as it comes from the tree; the apples in applesauce have been cut up, pureed, and heated.)

—How are the foods packaged?

—Are the foods grown locally or are they grown far away and transported over long distances?

—Must the foods be kept frozen or refrigerated before being served? Must they be cooked?

—Which foods do you think require the most energy to get from the farm to your table?

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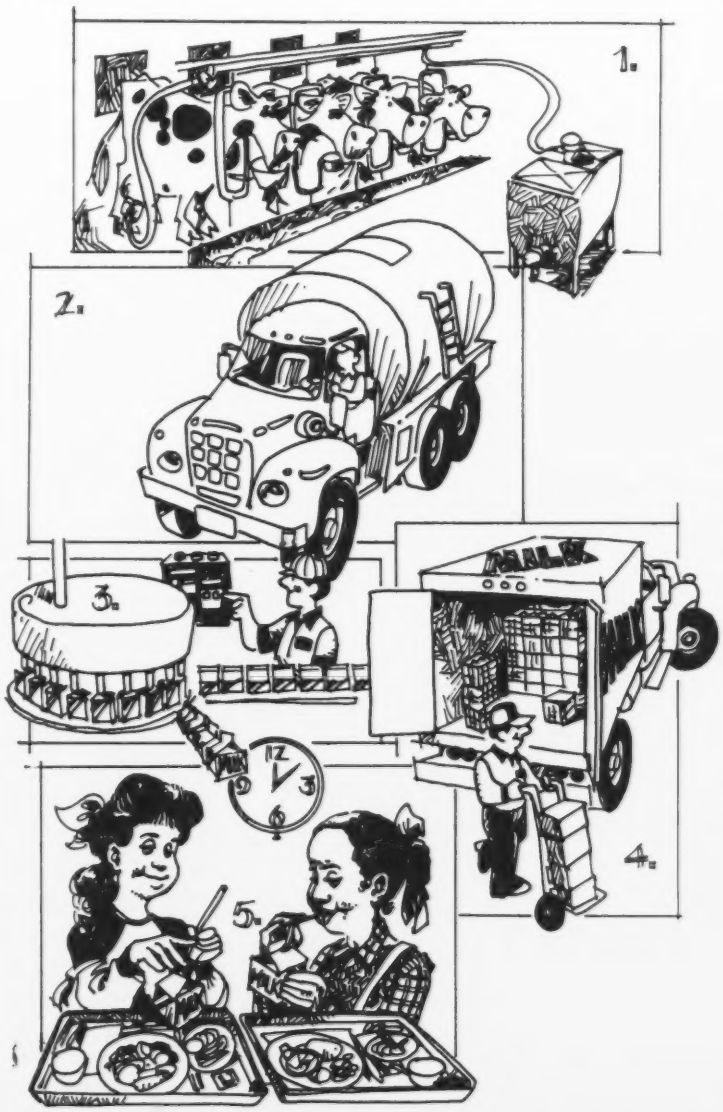


Probably very few of the foods named pass directly from farm to table. More than 75 percent of the foods we eat are processed, packaged, or both to some extent. They may be shipped long distances and stored before being purchased. Finally, foods are stored and prepared in the home. All of the various stages of food production and preparation require energy. Each step that a food makes between field and table requires energy. To the energy used in the natural food chain to produce the basic food, additional energy is used in the extended, man-made chain of processing, packaging, transporting, storing, and preparing food. Reinforce the idea that if edible food is discarded, all of the energy used not only to grow it but also to process it through the extended chain is wasted.

Distribute work sheet L. The graph on the work sheet illustrates the relative amounts of energy used in each phase of the extended man-made food chain. Have students use the information given in the pie graph to make a bar graph. Point out that relative amounts of energy needed to produce different foods may vary. For example, more energy is needed to produce a can for canned corn than a box for frozen corn. But more energy is needed to store frozen corn than canned corn.

Why Process Foods?

We hear a lot these days about eating "natural" and unprocessed foods. The purpose of much processing, however, is to keep food fresh and safe to eat. Without any processing, many foods would spoil and have to be discarded.

To find out more about the fascinating history of food preservation, have each student choose one of the following food preservation methods and do research about it in the library.

Pasteurization

Canning

Freezing

Drying

Salting

Freeze Drying

Help guide the research by asking questions such as the following:

—Who originated this method and when?

—Is it still used?

—What foods are preserved in this way?

—Can you describe the process?

—Can you use this method with food you grow at home?

—What are the advantages and disadvantages of this method?

Additional Resources

For more information and suggested activities related to food and energy refer to ***Food, Energy, and Society; Energy, Food, and You; Food: Where Nutrition, Politics, and Culture Meet;*** and ***It's Your Move*** (Resources, Section 2).

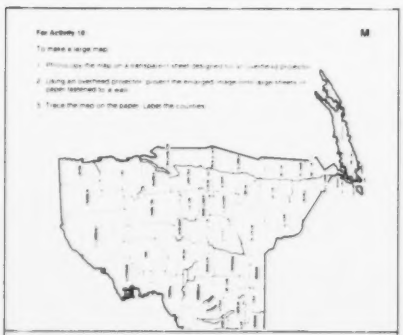
The Food Travelers

Advance Preparation

Obtain a large map of New York State or use map sheet M to create a large map.

Copy information sheet N for each student.

Bring construction paper, markers, and thumbtacks or pins.



M

For Activity 10

To make a large map:

1. Photocopy the map on a transparency sheet (ask your copy center for assistance).
2. Using an overhead projector, project the enlarged image onto large sheets of paper fastened to a wall.
3. Trace the map on the paper. Label the counties.

N

For Activity 10

New York State Agriculture

New York has the second largest agricultural economy in the United States. Agriculture is a major industry in many counties. The following list shows some of the important food products in the state and the counties where they are grown in large quantities.

Product	County or Area Where Grown in Large Quantities
Apples	Orleans, Wayne, Columbia, Dutchess, Ulster, and Orange counties.
Beans	Niagara, Orleans, and Genesee counties.
Cabbage	Suffolk, Orange, and Wayne counties.
Carrots	Orange, Orleans, and Wayne counties.
Cherries	Chautauqua, Columbia, Monroe, Niagara, Orleans, Schuyler, Ulster, and Wayne counties.
Dairy Products	Generally throughout the state, but there are many dairy farms in Allegany, Cayuga, Chautauqua, Chenango, Cortland, Delaware, Herkimer, Jefferson, Lewis, Madison, Oneida, Otsego, St. Lawrence, Steuben, Washington, and Wyoming counties.
Dried Beans	Cayuga, Genesee, Livingston, Monroe, Orleans, Ontario, and Wayne counties.
Eggs	Widespread, but many farms in Allegany, Cayuga, Chautauqua, Chenango, Erie, and Wayne counties.
Grapes	Erie, Chautauqua, Yates, Steuben, Schuyler, Ontario, Seneca, Wayne, Columbia, Niagara, Seneca, and Wayne counties.
Lettuce	Orange and Otsego counties.
Maple Syrup	Schoharie County.
Onions	Orange, Otsego, Orleans, Genesee, and Madison counties.
Pears	Columbia, Dutchess, Monroe, Niagara, Orange, Orleans, Ontario, Ulster, and Wayne counties.
Potatoes	Suffolk, Steuben, Wayne, Washington, Otsego, Orleans, Cayuga, Erie, Franklin, Genesee, Livingston, Madison, Monroe, and Ontario counties.
Snap Beans	Cayuga, Erie, Genesee, Monroe, Ontario, Orleans, Wayne, and Yates counties.
Sweet Corn	Cayuga, Dutchess, Erie, Genesee, Livingston, Monroe, Orange, Orleans, Suffolk, Ulster, Wayne, and Yates counties.
Tomatoes	Albany, Chautauqua, Erie, Monroe, Niagara, Onondaga, Orange, Orleans, and Suffolk counties.

Grown in New York

Fasten a large map of New York State to a class bulletin board. Distribute copies of information sheet N. Divide the class into small groups and assign each group one or more of the foods listed on the information sheet. Emphasize that these are some of the major food products of New York State. They are produced in large quantities in the areas shown; they may also be produced in other areas. Besides the major food products, smaller quantities of many other foods are grown or produced in New York.

Groups should make small labels to illustrate their assigned foods and pin them to the correct locations on the map. Have each group point out locations where its foods are grown.

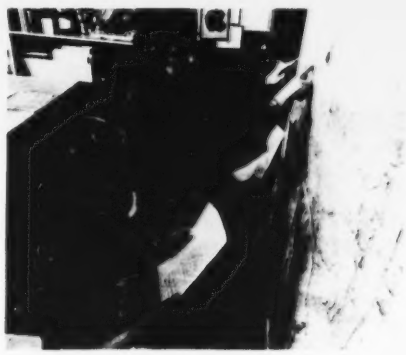
Questions for conversation:

—What, if any, foods are produced in large quantities in our county or borough?

—Are any other foods grown here that are not listed?
(Students may know of farms and roadside stands or farmers' markets that sell local produce. Your local Cooperative Extension agents can also provide information about locally grown food.)

—Does your family grow any food? If so, what kinds? Do you can or freeze any foods?

—How does the climate in New York affect the availability of locally grown foods?
(Fresh fruits and vegetables are generally available only during the growing season in the warm months. Canned, dried, and frozen foods may be available throughout the year. Foods such as bananas that require a long, hot growing season cannot be produced here.)



—What are some foods that are not produced in New York? List them on the chalkboard.
(Citrus fruits, pineapples, avocados, coffee, tea, coconut, cocoa, artichokes, black pepper, cinnamon, okra, cassava [used for tapioca]. Although technically peanuts and rice can be grown here, it is risky, and they can be considered "not grown in New York.")

—What form of energy is used to transport foods?
(Fuel for trucks, ships, trains, and even airplanes.)

Explain that less energy is usually required to transport locally grown foods the short distance to stores and markets than to bring foods from far away. Buying and eating locally grown foods when they are available helps save the energy that would be needed to transport them long distances to markets elsewhere. Additionally, many locally grown fresh foods are tastier and more nutritious than fresh foods that have been transported over long distances.

To learn about how food is brought into and distributed throughout New York City see the fascinating article in ***New York*** magazine, "How Your Food Gets to You" (Resources, Section 2). The article details the intricate workings of New York's largest wholesale markets.

(continued)

What If?

Ask students to pretend that there is a shortage of fuel for transportation and they can eat only foods grown in New York. Have them write essays describing what would happen. Questions to consider include:

—How would your diet change?

—Would you have to give up any of your favorite foods?

—How might a meal in the summer differ from one in the winter?

—Would you grow some of your own food? If so, what?

—Would you can or freeze any of the food that you would grow?

—What form of energy would be saved if more locally grown foods were eaten?

—What would be the advantages and disadvantages of eating only foods grown in New York?

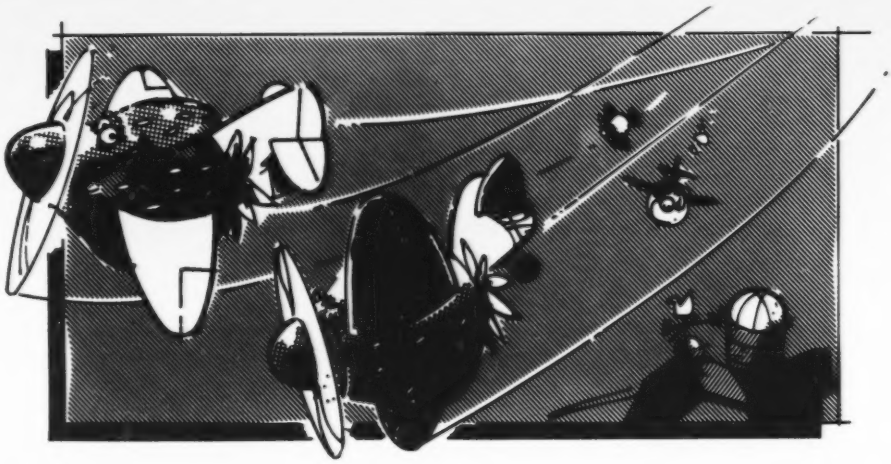
Perusing the Produce

Arrange to visit a grocery store, a fruit and vegetable stand, or a farmers' market or farm stand to see what foods are available and talk with the manager. Compile a list of questions to ask. They might include the following:

—Which fruits and vegetables were grown or produced in New York?

—How does the availability of fresh produce grown in New York vary throughout the year?

—What are possible advantages or disadvantages for your store in selling foods grown in New York?



Strawberry Express

The energy cost of transporting out-of-season fruits can sometimes be astoundingly high. When one kilogram of fresh strawberries, which has 354 Calories of food energy, is flown from California to New York, the energy cost is about 30,700 Calories.*

Additional Activities

Faraway Foods

Select several foods that are not grown in New York State. Have students do research to learn where they are grown and how far they are transported to reach your county or borough.

New York State Lunch

Help students plan and prepare a class lunch using only major food products of New York State.

Early Settlers

Have students do research to learn what foods the early settlers in New York State ate. Information and resources on this subject may be found in Level 4 of **Nutrition Comes Alive.**

Earth Friends

For more information on local and regional foods, contact the Earth Friends program at Columbia University (Resources, Section 2). One of the goals of the program is "to encourage children to discover existing foodways in their community and share in the creation of a rational and ecological food system."

Apples, Apples, Apples

Apples are a versatile fruit that can be eaten in many different forms. New York ranks second in the United States in apple production. Ask students to collect and share favorite family recipes that use apples.

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*_Food, Energy, and Society_, p. 129 (Resources, Section 2).

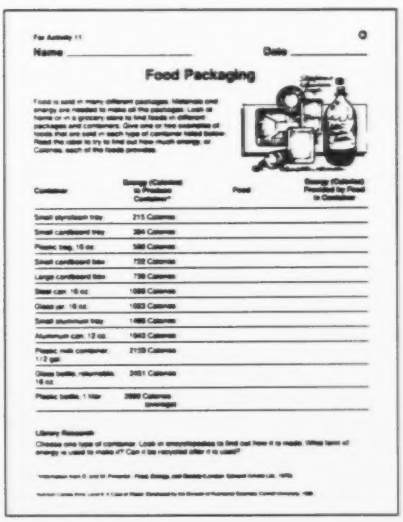
Food Packages

Advance Preparation

Have students bring in a variety of empty food packages and containers, including steel and aluminum cans; refillable and nonrefillable glass bottles; plastic bottles; cardboard boxes; styrofoam, cardboard, and aluminum trays; and plastic bags.

If possible, obtain ***How Do They Package It?*** (Resources, Section 2).

Copy work sheet O for each student.



For Activity 11 O

Name _____ Date _____

Food Packaging

Food is sold in many different packages. Materials and energy are needed to make all the packages. Look at home or in a grocery store to find foods in different packages and containers. Give one or two examples of foods that are sold in each type of container listed below. Read the label to try to find out how much energy, or Calories, each of the foods provides.

Container	Energy (Calories) to Produce Container*	Food	Energy (Calories) Provided by Food in Container
Small styrofoam tray	215 Calories		
Small cardboard tray	384 Calories		
Plastic bag, 16 oz.	588 Calories		
Small cardboard box	720 Calories		
Large cardboard box	756 Calories		
Steel can, 16 oz.	1006 Calories		
Glass jar, 16 oz.	1053 Calories		
Small aluminum tray	1466 Calories		
Aluminum can, 12 oz.	1643 Calories		
Plastic milk container, 1/2 gal.	2139 Calories		
Glass bottle, returnable, 16 oz.	2451 Calories		
Plastic bottle, 1 liter	3580 Calories (average)		

Library Research

Choose one type of container. Look in encyclopedias to find out how it is made. What form of energy is used to make it? Can it be recycled after it is used?

*Information from U. and W. Prescott, Food, Energy and Society (Lincoln: Universal Press Ltd., 1978).

Wrap It Up

Create a display of food packages in one area of the classroom. Packages may be grouped in several different ways—according to function, material, food enclosed, and so on. Have students group similar packages together, telling why they did so.

Questions for conversation:

—What different packages and materials are used to hold food?

—Which packages are associated with particular foods?

—What are the purposes of food packages? List answers on the chalkboard.
(Hold the food; protect the food from dryness or moisture, extremes of temperature, dirt, and loss of flavor; make the food more convenient and easy to use; advertise the food; give information about and instructions for using the food; list the price of the food; and make the food more difficult to tamper with or steal.)

—Examine the different packages. Which of the listed purposes does each package fulfill?

—Could any packages or parts of packages be eliminated without decreasing the quality of the food? For example, do tea bags need to be individually packaged?

Explain that energy is required to produce all packages and containers. Some containers may require more energy to produce than the food inside provides. For example, a 455-gram can of corn that provides 457 Calories is packed in a steel can that takes 1006 Calories to produce. A diet soft drink that provides 1 Calorie of food energy is held in an aluminum can that takes 1643 Calories to produce. Recycling or reusing food containers saves energy. Recycling will be discussed in detail in Section 3.

(continued)

In the Cupboard

Distribute work sheet O. Have students complete it as homework. Review the answers. Have students report their findings about the energy required to manufacture various packages.

The "Good Old Days"?

Invite a senior citizen to talk with the class about food packaging and how it has changed during his or her lifetime. The visitor might even talk about changes seen by his or her parents or grandparents. Have the students prepare questions such as the following:

—When you were a child what type of packages were used to hold food?

—Did you buy any foods in bulk from barrels?

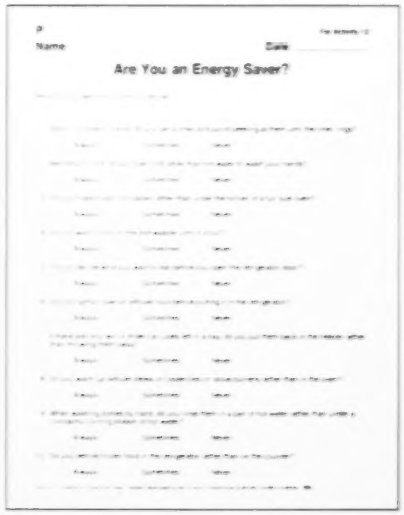
—What are some new containers that have been developed during your lifetime?

The book ***How Do They Package It?*** (Resources, Section 2) details the history and development of most food packages.

Energy Use at Home

Advance Preparation

Copy work sheet P for each student.


P

Name _____ Date _____

Are You an Energy Saver?

Energy Savers

In Activity 10, students learned that about 26 percent of the energy required to get food from farm to table is used in food storage and preparation in the home. We can reduce this energy use. Work sheet P gives students a chance to test their energy-saving habits and knowledge.

Distribute work sheet P and have the students complete it. When they are finished, have them score their answers. Each "always" answer is worth five points, each "sometimes" is worth two points, and each "never" is worth nothing. Students should total their points and rate themselves.

40–50 points:
Energy Miser (Congratulations! You are an energy miser.)

30–39 points:
Energy Saver (You know how to save a watt or two.)

20–29 points:
Energy Leaker (With a little more effort, you can be an energy saver.)

19 points or less:
Energy Loser (It's never too late to change your energy habits.)

Review the reasons for each answer.

1. Peeking allows heated air to escape. The oven then uses more energy to regain the correct temperature.

2. Cold water will get hands clean, and it takes extra energy to heat water.

3. Less energy is needed to heat small spaces.

4. Almost as much hot water is needed to wash a full load of dishes as a partial load. Energy is saved by running the dishwasher as little as possible.

5. Whenever the refrigerator door is open, cold air escapes. More energy is needed to recool the air.

(continued)

6. When food is uncovered, moisture escapes into the refrigerator. The refrigerator uses additional energy to transform the moisture into frost.

7. Freezing ice requires a large amount of energy. Therefore, saving ice saves energy.

8. A stove-top burner uses less energy than the whole oven.

9. Allowing hot water to run continuously is very wasteful of energy.

10. As it defrosts, the frozen food helps keep the refrigerator cool, thus saving energy.

Kitchen Observation

Have each student look around the kitchen at home and list all of the different food-related equipment and appliances that use electricity, gas, or fuel oil. (Stove, refrigerator, water heater, microwave oven, electric coffee maker, electric frying pan, toaster, toaster oven, crock pot, electric mixer, blender, food processor, electric can opener, electric juicer, electric ice cream freezer, dishwasher.)

Point out that many appliances save time and human effort. This is a valuable savings especially now that so many family members work full time outside of the home. Some appliances, however, are much more important to us than others. For example, we probably rely far more on our stove than on our electric hot dog cooker.

Have students review their lists of appliances and equipment. Ask each student to pick the five items that he or she thinks are most important and the two or three that would be easiest to live without. Have students compare and discuss reasons for their ratings.

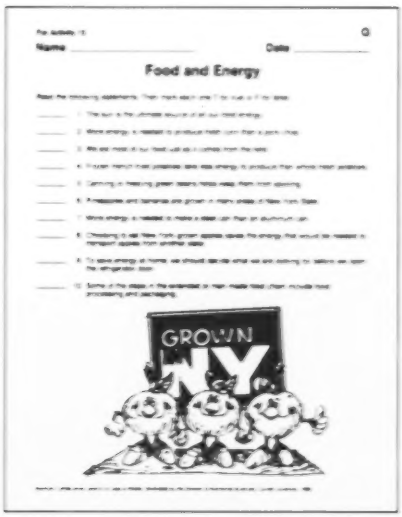
Compare Appliances

Have students do research to determine the amount of energy used by different home appliances. Many local utility companies and Cooperative Extension offices have information on this subject.

Evaluation

Advance Preparation

Copy work sheet Q.


Q

Name _____ Date _____

Food and Energy

GROWN NY

Making Choices

Ask the students to list some ways to decrease the amount of energy used in the extended food chain. (Select locally grown foods, minimally processed foods, foods with little packaging or packaging that can be recycled.)

Share the Knowledge

Have students design posters to illustrate important ideas learned in this section. Display the posters in your school or in another local school.

Tell the Truth

Distribute work sheet Q to the class. After the students complete the work sheet, discuss their answers.

Answer key: True—1, 5, 8, 9, 10

False—2, 3, 4, 6, 7

Then have each student use information presented in the section to make up one true-false question. Students can ask each other these questions.

Section 3

A Case of Waste

Down in the Dumps

Understanding:

Sensible use of food and food-related resources can help protect our environment.

Before You Start

The final resting place for wasted food and food packaging is often a landfill or dump. In our country, with only 6 percent of the world's population, we generate more than 70 percent of the world's garbage, much of it food and packaging. We then spend several billion dollars a year to store, collect, and dispose of this garbage. But we are running out of places to put it. Our landfills are overflowing, and other disposal methods can pollute the air and water.

One way to lessen the problem is to change our wasteful ways. In this section, students will explore the problem of waste disposal from an ecological perspective. Conservation of food and packaging is advocated as a way to decrease our production of garbage and help protect our environment.

Activities	Subject
14. Garbage Takes Over	Social Studies, Math, Language Arts
16. Getting Rid of It	Science, Social Studies, Language Arts
16. Once Is Not Enough—Recycle	Language Arts, Science
17. Waste Not	Math, Language Arts
18. Luscious Leftovers	Social Studies, Math, Home and Career Skills
19. Evaluation	

Section 3

Resources

Garbage. Available from Audiovisual Resource Center, 8 Research Park, Cornell University, Ithaca, NY 14850. 1970.

This eleven-minute silent film eloquently shows the sea of garbage that threatens to engulf us. The film gathers momentum as it traces the path of garbage from when it is deposited in familiar metal garbage cans to its final resting place in enormous landfills.

Re/Uses. C. Jabs. New York: Crown, 1982.

This infectiously cheerful and inventive book outlines 2,133 ways to recycle and reuse things you might ordinarily throw away. Anyone who hates to throw things away will enjoy this book, which views trash as a valuable resource.

Garbage Takes Over

Advance Preparation

Copy work sheet R for each student.

Bring a scale from the nurse's office or from home.

Obtain the film ***Garbage*** (Resources, Section 3) (optional)

R

Name _____ Date _____

The City Gazette

Garbage Takes Over

H

Garbage Production

Do the following warm-up activity:

Multiply the number of students in the classroom by 3.5 pounds—the amount of garbage an average American generates each day.

Collect and weigh a variety of classroom materials until their combined weight equals the estimated number of pounds of garbage the class would produce in one day.

Then have students calculate the number of pounds of garbage the class would produce in a year.

When our garbage is collected regularly, we rarely stop to think about the total quantity generated or the logistics of disposal. Students may be surprised to find out how much garbage is produced each day by an average group of Americans.

The Garbage Explosion

When a garbage collection system shuts down, as happened during the 1968 New York City garbage strike, the accumulation can rapidly turn an entire city into an ugly, reeking dump. The mountains of uncollected garbage in the streets of New York were a graphic illustration of the vast quantity of garbage Americans produce.

Distribute work sheet R. Explain that this fictional newspaper story describes a real event that happened in February of 1968. Allow the class time to complete the math problems.

Answer key: 1. 11,000 2. 22,000,000 pounds 3. 99,000 tons 4. 16,500 loads 5. Answers will vary. 6. 2.75 pounds

(continued)

Discuss garbage production in your community, using questions such as the following:

—What items does your family throw away during a typical week?

—Does your family put garbage out for collection? If so, how much do you usually put out? How often is it collected?

—If you don't put garbage out for collection, what do you do with it?

—What would happen in your community if no garbage were collected for nine days, or if the landfill or garbage facility were closed for nine days?

—How could you or your family produce less garbage?

The Garbage Chain

If possible, show the film ***Garbage*** to your class (Resources, Section 3). This short, silent film eloquently illustrates the consequences of our throw-away habits. The film gathers momentum as it traces the path of garbage from when it is deposited in familiar metal garbage cans to its final resting place in enormous landfills.

Additional Activities

Library Research

If students have access to a library with back issues of the **New York Times** or **Time** or **Newsweek** magazines on microfilm, they can look up actual accounts of the garbage strike. Then they can write their own reports of the strike.

Debate the Issue

Students can stage a debate or write essays from the viewpoint of either New York City garbage collectors, striking for better pay, or apartment residents, irate about uncollected garbage. What is each group's position? Let students argue their respective positions and propose solutions.

Local Issues?

Many counties or boroughs in New York State are experiencing crises because they are running out of places to put their garbage. Your town or city may be one of many that must decide what to do with its garbage when the landfill is full. If there is a garbage disposal problem in your community, have students research the issue by reading local newspapers and interviewing community representatives. What are possible solutions to the problem? What seems to be the best solution? Why?

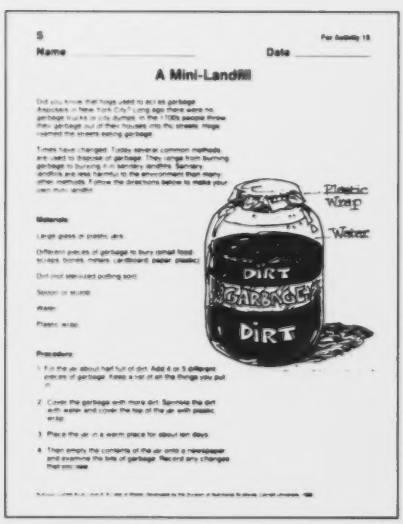
Getting Rid of It

Advance Preparation

Copy work sheet S for all students.

Collect

- Several empty gallon-sized glass or plastic jars (often available from the school cafeteria or restaurants).
- Dirt (not sterilized potting soil).
- Assorted small pieces of garbage such as food, metal, paper, cardboard, and plastic, collected from home and school. (There should be 4 or 5 pieces of garbage for each jar.)
- Plastic wrap to cover containers.
- Spoons or scoops for dirt.
- Newspaper to protect tables when making landfills.



S For Activity 15

Name _____ Date _____

A Mini-Landfill

Did you know that frogs used to act as garbage disposals in New York City? Long ago there were no garbage trucks or city dumps. In the 1700's people threw their garbage out of their houses into the streets. Hogs roamed the streets eating garbage.

Times have changed. Today several common methods are used to dispose of garbage. They range from burning garbage to burying it in sanitary landfills. Sanitary landfills are least harmful to the environment than many other methods. Follow the directions below to make your own mini- landfill.

Materials

Large glass or plastic jars

Different pieces of garbage to bury (small food scraps, bones, rinsed cardboard, paper, plastic)

Dirt (not sterilized potting soil)

Spoon or scoop

Water

Plastic wrap

Procedure

1. Fill the jar about half full of dirt. Add 4 or 5 different pieces of garbage. Keep a list of all the things you put in.
2. Cover the garbage with more dirt. Sprinkle the dirt with water and cover the top of the jar with plastic wrap.
3. Place the jar in a warm place for about ten days.
4. Then empty the contents of the jar onto a newspaper and examine the bits of garbage. Record any changes that you see.

Plastic Wrap

Water

DIRT

GARBAGE

DIRT

A Mini-Landfill

Distribute work sheet S. Point out that some methods of garbage disposal such as open dumping are harmful to the environment. Review the differences between sanitary landfills and open dumps. Landfills are preferable because the garbage is immediately covered with a layer of dirt so there is less chance of air pollution and infestation by rats and flies.

But not everything about landfills is good. As certain materials decompose, they may release harmful substances that pollute the water in the ground and consequently the drinking water. Although landfills are less unsightly than open dumps, they are still ugly while they are being used and many people don't want to live near them. Once landfills are completed, they can continue to settle as materials decompose, so that structures cannot be built on them for many years.

With careful landscaping, it is possible to turn garbage into an attraction, as shown by the example of Tifft Farm (see box).

Divide the class into as many groups as there are jars. Have each group create a mini-landfill by following the directions on work sheet S. When the landfills are completed, students should leave them undisturbed for about ten days. Then each group should uncover its landfill to see whether any materials have changed. Make lists on the chalkboard of materials that changed and didn't change. Food scraps and paper are most likely to show some decomposition. Metals such as steel may begin to rust.

Discuss the process of decomposition with the class.

Questions for conversation:

—What conditions are necessary for decomposition?
(Presence of spores from molds and fungi, bacteria, moisture, air, and organic materials.)

—How are decomposing organisms such as fungi and molds related to food chains?
(They are the final step in natural food chains. Decomposers break down food into substances that can be used again by growing plants.)

(continued)

—Does anyone have a compost heap at home? If so, what materials do you put in it? What happens to them? How do compost heaps compare to landfills?
(Layers of organic materials such as food scraps, leaves, and grass clippings are usually alternated with soil. The materials will decompose. Compost heaps may be considered all-organic small landfills.)

—Would it be possible to start a compost heap at home or at school?

As communities run out of space for new landfills, they must find other methods to dispose of garbage. Berkeley, California, for example, is trying a citywide composting program. Under this program, 25 percent of Berkeley's garbage load is now composted into high-quality soil and sold to gardeners, landscapers, and other community members.

Other communities are burning refuse to produce steam that is converted into electricity. Since 1984 a refuse-to-energy facility in Peekskill, New York, has been burning about 1,800 tons of Westchester County's garbage each day. Enough electricity is produced to supply about 40,000 homes, and the volume of solid waste that must eventually enter landfills in the area is decreased by about 90 percent.

Local Disposal

Students may explore the refuse-disposal system in their community by writing a letter to an official of the local sanitation department or inviting an official to speak with the class.

Students can prepare questions such as the following for discussion with the visitor:

—How is garbage collected?

—Where is garbage taken after it is collected?

—How many trucks are used in the local area?

—How many people work in or on each truck?

—What other equipment is used? Compactors? Incinerators? Bulldozers? Conveyor belts?

—How much does it cost the city or town to dispose of garbage in one year?

—Is there a recycling program in the community? What materials are recycled?

—What are some ways to conserve energy in the disposal system?

—Would it be possible for our community to start a composting program?

Additional Activities

Fuel or Compost

Have students research the use of garbage as fuel or compost. What are the advantages and disadvantages of such systems? If there is enough space in your school yard, you might want to start a school composting project. Local Cooperative Extension agents can provide more information about composting.

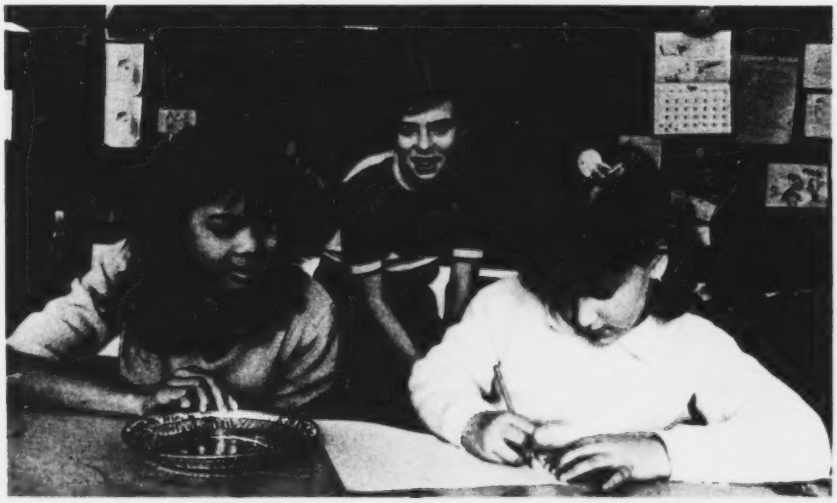
Clean It Up

Plan a clean-up project for a littered area, such as the school yard or a local park. Students can write to the school or community paper, explaining their clean-up project and the quantity and content of garbage that was collected. They can make suggestions about how to decrease the amount of litter in that area.

Tifft Farm Nature Preserve

When the city of Buffalo, New York, decided to build a new sewage treatment plant on Squaw Island in the Niagara River, it first needed to move the almost two million cubic yards of solid waste that had been dumped there. The city planned to move the garbage to nearby Tifft Farm, a 75-acre overgrown wasteland along the eastern end of Lake Erie. But although Tifft Farm appeared to be a wasteland, bird-watchers, fishermen, and nature lovers considered it an ecological oasis. These people convinced the city to arrange the relocated garbage so that it would not ruin special features of the area. Accordingly, when the garbage was moved to the site it was bulldozed into four large mounds that were then covered with two feet of soil. The mounds have become an important attraction in the nature preserve, showing that with careful planning garbage can be an asset.

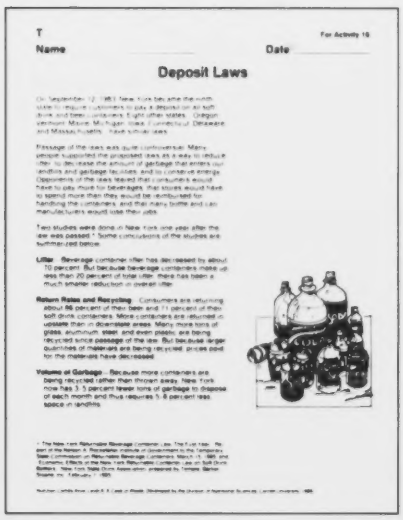
Once Is Not Enough—Recycle



Advance Preparation

Copy information sheet T for each student.

Collect several of the following items and place them in a garbage bag: plastic milk container, disposable aluminum pie plate, brown paper bag, styrofoam meat tray, empty glass jar, empty steel can, and plastic margarine tub.



T

Name _____ Date _____

For Activity 16

Deposit Laws

On September 12, 1983, New York became the ninth state to require customers to pay a deposit on all soft drink and beer containers. Eight other states—Oregon, Vermont, Maine, Michigan, Iowa, Connecticut, Delaware, and Massachusetts—have similar laws.

Passage of the laws was quite controversial. Many people supported the proposed laws as a way to reduce litter, to decrease the amount of garbage that enters our landfills and garbage facilities, and to conserve energy. Opponents of the laws feared that consumers would have to pay more for beverages, that stores would have to spend more than they would be reimbursed for handling the containers, and that many bottle and can manufacturers would lose their jobs.

Two studies were done in New York one year after the law was passed.* Some conclusions of the studies are summarized below.

Litter—Beverage container litter has decreased by about 70 percent. But because beverage containers make up less than 20 percent of total litter, there has been a much smaller reduction in overall litter.

Return Rates and Recycling—Consumers are returning about 86 percent of their beer and 71 percent of their soft drink containers. More containers are returned in upstate than in downstate areas. Many more tons of glass, aluminum, steel, and even plastic are being recycled since passage of the law. But because larger quantities of containers are being recycled, prices paid for the materials have decreased.

Volume of Garbage—Because more containers are being recycled rather than thrown away, New York now has 3.5 percent fewer tons of garbage to dispose of each month and thus requires 1.8 percent less space in landfills.

* The New York Returnable Beverage Container Act, The First Year, Report of the Master Tax Preparation Unit, New York State Department of Taxation and Finance, March 1, 1984; and Economic Effects of the New York Returnable Container Law on Soft Drink Bottlers, New York State Drink Association, prepared by Temple, Barker, Sloane, Inc., February 1, 1984.

Second Time Around

In Activities 13 and 14, students thought about the vast quantities of garbage that we produce and considered common disposal methods. Tell them that now they will have a chance to think about ways to recycle or reuse food packages to avoid throwing them away. Every item that can be rerouted from the disposal system saves space in our landfills and thus helps to preserve our environment.

Write on the chalkboard "Garbage is what you throw away." Conversely, anything that continues to be used in any way is not garbage. Sometimes all it takes to reuse something and save it from becoming garbage is a bright idea. Many items, such as glass and metals, can also be recycled and remade into new products.

Divide the class into several teams and give each team an item from your garbage bag. Allow each team 10 minutes to think of as many ways as possible to reuse or recycle the item. Encourage students to think creatively and to generate complex as well as simple ideas. After 10 minutes, have each group present its ideas to the rest of the class.

You may want to have the class compile a list of the best suggestions to share with their families or with other classes.

The War Effort

Invite a person who remembers the nationwide recycling efforts that took place during World War II to speak to the class. Ask him or her to talk about what materials were collected, what they were used for, and why recycling was especially important during the war.

The Bottle Bill

Requiring mandatory deposits on beverage containers as an incentive to return them for recycling is one way to reduce the burden on our garbage disposal systems. But the passage of such deposit laws has generated much controversy. New York State instituted a deposit law in 1983, and one year later, two groups studied some of the effects of the law. Information sheet T summarizes information gathered during the studies.

(continued)

Distribute information sheet T. After students read it, consider the following questions for discussion:

—Does a deposit law require that all containers be returned or redeemed?
(No.)

—What is the difference between refillable and redeemable containers?
("Refillable" containers are cleaned and refilled; other containers may be broken down and reformed into new containers, or they may be discarded.)

—What materials used for beverage containers are most easily recycled?
(Glass and aluminum are much easier to recycle than plastic.)

—What have been some positive effects of New York's deposit law?

—What have been negative effects of the law?

—Do you feel a deposit law is worth the trouble?

Additional Activities

Redemption/Recycling Research

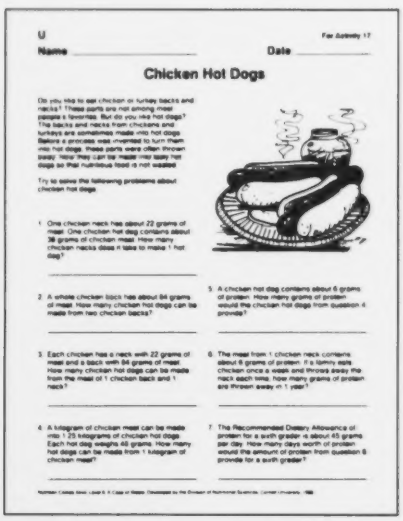
Have students find out what facilities are available locally for bottle and can redemption and for recycling of other materials.

Waste Not

Advance Preparation

Copy work sheet U and information sheet V for each student.

Bring chicken- or turkey- and beef-based hot dogs; equipment and utensils to cook and eat them; and blindfolds.



U — For Activity 17

Name _____ Date _____

Chicken Hot Dogs

Do you like to eat chicken or turkey backs and necks? These parts are not among most people's favorites. But do you like hot dogs? The backs and necks from chickens and turkeys are sometimes made into hot dogs. Before a process was invented to turn them into hot dogs, these parts were often thrown away. Now they can be made into tasty hot dogs so that nutritious food is not wasted.

Try to solve the following problems about chicken hot dogs.

1. One chicken neck has about 22 grams of meat. One chicken hot dog contains about 36 grams of chicken meat. How many chicken necks does it take to make 1 hot dog?

2. A whole chicken back has about 84 grams of meat. How many chicken hot dogs can be made from two chicken backs?

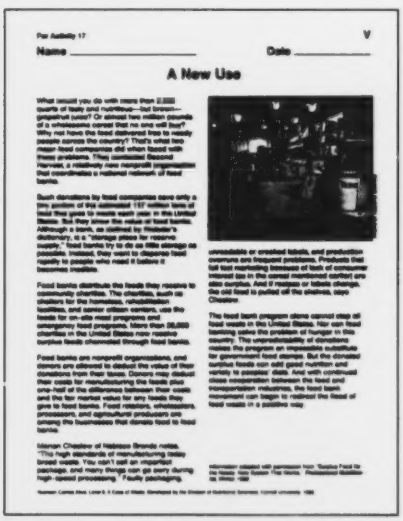
3. Each chicken has a neck with 22 grams of meat and a back with 84 grams of meat. How many chicken hot dogs can be made from the meat of 1 chicken back and 1 neck?

4. A kilogram of chicken meat can be made into 1.25 kilograms of chicken hot dogs. Each hot dog weighs 48 grams. How many hot dogs can be made from 1 kilogram of chicken meat?

5. A chicken hot dog contains about 6 grams of protein. How many grams of protein would the chicken hot dogs from question 4 provide?

6. The meat from 1 chicken neck contains about 6 grams of protein. If a family eats chicken once a week and throws away the neck each time, how many grams of protein are thrown away in 1 year?

7. The Recommended Dietary Allowance of protein for a sixth grader is about 45 grams per day. How many days worth of protein would the amount of protein from question 6 provide for a sixth grader?



For Activity 17 — V

Name _____ Date _____

A New Use

What would you do with more than 2,000 quarts of tasty and nutritious—but bruised—grapefruit juice? Or almost two million pounds of a wholesome cereal that no one will buy? Why not have the food delivered free to needy people across the country? That's what two major food companies did when faced with these problems. They contacted Second Harvest, a nationally based nonprofit organization that coordinates a national network of food banks.

Such donations by food companies save only a tiny portion of the estimated 197 million tons of food that goes to waste each year in the United States. But they show the value of food banks. Although a bank, as defined by Webster's dictionary, is a "storage place for reserve supply," food banks try to do as little storage as possible. Instead, they want to dispense food rapidly to people who need it before it becomes inedible.

Food banks distribute the foods they receive to community charities. The charities, such as shelters for the homeless, rehabilitation facilities, and senior citizen centers, use the foods for on-site meal programs and emergency food programs. More than 26,000 charities in the United States now receive surplus foods channeled through food banks.

Food banks are nonprofit organizations, and donors are allowed to deduct the value of their donations from their taxes. Donors may deduct their costs for manufacturing the foods plus one-half of the difference between their costs and the fair market value for any foods they give to food banks. Food retailers, wholesalers, processors, and agricultural producers are among the businesses that donate food to food banks.

Marcon Chesbro of Hebrew Brands notes, "The high standards of manufacturing today breed waste. You can't sell an imperfect package, and many things can go awry during high-speed processing." Faulty packaging, unreadable or crushed labels, and production overruns are frequent problems. Products that fall foul marketing because of lack of consumer interest (as in the cereal mentioned earlier) are also surplus. And if recipes or labels change, the old food is pulled off the shelves, says Chesbro.

The food bank program alone cannot stop all food waste in the United States. Nor can food banking solve the problem of hunger in this country. The unpredictability of donations makes the program an impossible substitute for government food stamps. But the donated surplus foods can add good nutrition and variety to peoples' diets. And with continued close cooperation between the food and transportation industries, the food bank movement can begin to redirect the flow of food waste in a positive way.

Information adapted with permission from "Surplus Food for the Needy Goes Under The Knife," Postindustrial Bulletin, 16, Winter 1988.

Commercial Food Waste

According to the 1977 report of the comptroller general, 137 million tons of food, or 20 percent of the food produced each year in the United States, is wasted. Much of the waste occurs at the commercial level. Sometimes a creative idea can transform "problem" food into a desirable and useful product. In this activity students will see how two very different approaches have reduced the amount of food wasted commercially.

Taste and Tell

Have the students cook both chicken or turkey and beef hot dogs and cut them into small pieces for tasting. Can a blindfolded "taste panel" distinguish between the two products? Have students compare labels from the two products. Which ingredients are the same in both hot dogs? Which differ?

How do the reactions of your class compare to those of taste panels at Cornell University? At Cornell, in three out of three taste tests, blindfolded panel members selected a turkey hot dog as the one they liked best.

Poultry Hot Dogs

Ask the students whether they eat chicken and turkey necks and backs. These parts of the chicken are often thrown away. But do they eat chicken or turkey hot dogs? Explain that chicken and turkey hot dogs were developed to use the parts that are less popular and often thrown away. Producing an edible product from foods that are often thrown away is one way to reduce food waste and avoid the environmental consequences of food disposal.

Note that all hot dogs are high in fat, therefore, it is not advisable to eat them too often.

Distribute work sheet U and have students complete the math problems.

Answer key: 1. 1.64 necks 2. 4.7 hot dogs 3. 2.9 hot dogs 4. 27.7 hot dogs 5. 166.7 grams 6. 312 grams 7. 6.9 days

(continued)

Food Donations

Many things can go awry in the food-manufacturing process. Cans may be slightly dented or mislabeled, or specifications (the manufacturer's recipe) for a product may be changed, making all previously manufactured food obsolete. Manufacturers in such cases used to have no choice but to discard the food, even if it was still edible and tasty. Food was wasted and had to be disposed of, which used resources and energy. Now, nonprofit organizations known as "food banks" have been established throughout the United States. These organizations accept and store donated foods before distributing them to charitable organizations such as soup kitchens and food pantries. In this way food waste is reduced.

Distribute information sheet V. Have students read about food banks. Then discuss the following questions:

—How do food banks prevent food waste?

—What, if any, charitable organizations in your community receive food from a food bank? Where is the food bank?
(The addresses of the food banks in New York State are listed in Appendix 3.)

—Why is it difficult to distribute surplus foods before they spoil?
(Need facilities to store food safely, transportation, and volunteer workers.)

—Do you think that food manufacturers should receive a tax deduction for all foods that they donate, even such foods as caramel syrup or popsicles?

—Why would it be difficult to rely on donated foods for an everyday food supply?
(Donations are unpredictable and may vary widely from day to day.)

—Would you drink brown grapefruit juice if it was free?

Additional Activities

Field Trip or Visitor

Arrange for the class to visit a food bank, soup kitchen, or food pantry, or invite a representative from one of those organizations to come and talk to the class. Students can find out how the organization is run and how food is collected and distributed.

Luscious Leftovers

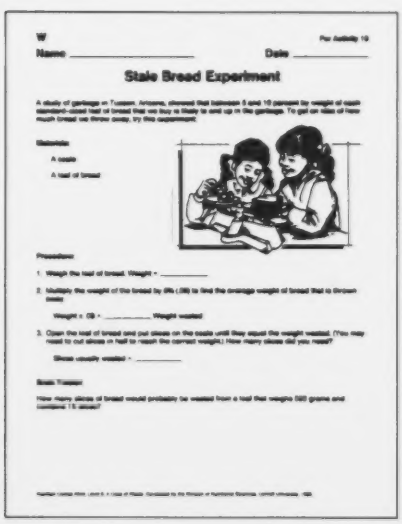
Advance Preparation

Arrange for a local Cooperative Extension agent or a home economist to speak to the class about proper food handling and storage techniques.

Copy work sheet W for each student.

Collect a table scale, 4 or 5 loaves of bread, and 4 or 5 knives.

Bring ingredients and equipment listed in the recipe below to make banana bread.



W

Name _____ Date _____

Stale Bread Experiment

A study of garbage in Tucson, Arizona, showed that between 5 and 10 percent by weight of each standard-sized loaf of bread that we buy is likely to end up in the garbage. To get an idea of how much bread we throw away, try this experiment.

Materials:

A scale

A loaf of bread

Procedure:

1. Weigh the loaf of bread. Weight = _____

2. Multiply the weight of the bread by .05 (.05) to find the average weight of bread that is thrown away.

Weight x .05 = _____ Weight wasted

3. Open the loaf of bread and put slices on the scale until they equal the weight wasted. (You may need to cut slices in half to reach the correct weight.) How many slices did you need?

Slices usually wasted = _____

Math Problem:

How many slices of bread would probably be wasted from a loaf that weighs 500 grams and contained 15 slices?

For Activity 18

Food Safety

Sometimes we throw away food because it has spoiled or because we are unsure whether it is still safe to eat. Proper handling and storage techniques help keep food safe and fresh to eat, thus reducing potential waste. Invite a local Cooperative Extension agent or home economist to talk to the class about food safety and food storage techniques.

Stale Bread

According to studies of garbage in Tucson, Arizona, between 5 and 10 percent by weight of each standard-sized loaf of bread that we buy is likely to end up in the garbage. Even larger amounts of such specialty bread products as hamburger rolls or sweet buns are discarded. To find out how much bread is usually discarded, have students try the experiment on work sheet W.

Divide the class into four or five groups, giving each group one loaf of bread and one knife. Place a table scale where everyone can have access to it. Distribute work sheet W and have each group complete it. Compare the answers from different groups.

Have the class think of as many ways as possible to use bread that might be thrown away. (Ideas might include making bread crumbs, croutons, or bread pudding. Odd slices of bread can be bagged and frozen until there is enough for a particular recipe.)

Caution: It is acceptable to eat stale bread, but it is not acceptable to eat moldy bread. Moldy bread may be harmful. To demonstrate what moldy bread looks like, place a piece of bread in a plastic bag and keep it in a warm place for several days.

(continued)

Really Ripe Bananas

Sometimes we throw away such foods as sour milk or overripe fruit because we do not know of any good uses for them. Using overripe bananas to make banana bread illustrates a tasty way to use food that might otherwise be discarded.

Divide the class into several small groups and provide each group with the ingredients and equipment to make a loaf of banana bread. While the students eat the bread they have prepared, ask them to think of other uses for overripe bananas. (Banana pudding, muffins, milk shakes, and yogurt.)

Banana Bread

(1 loaf)

Equipment

Sifter
Measuring spoons
Measuring cups, dry and liquid
Electric mixer
Mixing spoon
2 mixing bowls
8 1/2 x 4 1/2-inch loaf pan

Ingredients

1 3/4 cups flour
2 1/4 teaspoons baking powder
1/2 teaspoon salt
1/3 cup margarine
2/3 cup sugar
1 egg, beaten
2 or 3 overripe bananas to make 1 1/4 cups pulp
1/2 cup chopped walnuts (optional)

Procedure

1. Sift together flour, baking powder, and salt.
2. In a separate bowl, cream together margarine and sugar. Add egg and bananas. Beat together.
3. Add sifted ingredients to banana mixture. Beat until smooth.
4. Mix in nuts (optional).
5. Pour batter into greased pan. Bake about 1 hour at 350 degrees F or until done. Cool before slicing.

Food Saver's Cookbook

Ask students to bring from home favorite family recipes for using leftover food. Also, have students brainstorm suggestions for using leftovers. Groups of students can then edit and illustrate the recipes and suggestions. Make copies so that each student can compile a Food Saver's Cookbook to share with family members.

Evaluation

In the News

Have the class use information learned in this section to create a newspaper. They can share the newspaper with other students or members of the community.

Components of a newspaper could include:

- Headline articles about problems related to garbage disposal in your community, about the effect of the bottle bill in your neighborhood, or about a local soup kitchen or food pantry and its use of donated foods.
- Interviews with local recyclers or bottle and can redemption centers.
- "How to" tips on composting garbage or reusing materials.
- Recipes for using leftover foods.
- Puzzles and quizzes about garbage or food waste.
- "Astounding facts" on the amount of garbage created in your community.
- Drawings and captions to illustrate the articles.

Teach Back

Divide the class into five groups, one for each of the activities in Section 3. Ask each group to produce a bulletin board or library display to demonstrate what they learned from the activity.

Decreasing Waste

Have students list as many ways as possible to decrease waste of food and food-related resources in your community.

Appendix 1

Cornell Cooperative Extension

ALBANY
518-765-3550

Cooperative Extension
Albany County Resources
Development Center
Martin Road, R.D. 2, Box 131
Voorheesville, NY 12186

ALLEGANY
716-268-7644

Cooperative Extension
County Rd. 48
R.D. 1, Box 226
Belmont, NY 14813

BROOME
607-772-8953

Cooperative Extension
Farm, Home and 4-H Center
840 Front Street
Binghamton, NY 13905

CATTARAUGUS
716-699-2377

Cooperative Extension
Cooperative Extension Center
Parkside Drive
Ellicottville, NY 14731

CAYUGA
315-255-1183

Cooperative Extension
Farm, Home and 4-H Center
248 Grant Avenue
Auburn, NY 13021

CHAUTAUQUA
716-664-9502

Cooperative Extension
Chautauqua County Agricultural Center
R.D. 2
Turner Road, Box 341 A
Jamestown, NY 14701-9608

CHEMUNG
607-734-4453

Cooperative Extension
425 Pennsylvania Ave.
Elmira, NY 14904

CHENANGO
607-334-2634

Cooperative Extension
Farm, Home and 4-H Center
99 North Broad Street
Norwich, NY 13815

CLINTON
518-561-7450

Cooperative Extension
Old Court House Building
Margaret Street
Plattsburgh, NY 12901

COLUMBIA
518-828-3346

Cooperative Extension
Extension Center
Route 66, R.D. #1
Hudson, NY 12534

CORTLAND
607-753-5077

Cooperative Extension
County Office Building
60 Central Avenue
P.O. Box 5590
Cortland, NY 13045

DELAWARE
607-865-6531

Cooperative Extension
P.O. Box 184, NYS Rt. 10
Hamden, NY 13782

DUTCHESS
914-677-5061

Cooperative Extension
P.O. Box 259, Rt. 44
Millbrook, NY 12545

ERIE
716-652-1170

Cooperative Extension
Cooperative Extension Center
21 South Grove Street
East Aurora, NY 14052

ESSEX
518-962-8241

Cooperative Extension
Agricultural Center
Sisco Street
Westport, NY 12993

FRANKLIN
518-483-6767

Cooperative Extension
Cooperative Extension Headquarters
11 Brewster Street
Malone, NY 12953

FULTON
518-765-6441

Cooperative Extension
57 East Fulton Street
Gloversville, NY 12078

GENESEE
716-343-3040

Cooperative Extension
Cooperative Extension Center
420 East Main Street
Batavia, NY 14020

GREENE
518-622-9820

Cooperative Extension
Extension Center
HCR #3, Box 906
Cairo, NY 12413

HAMILTON
518-548-6191

Cooperative Extension
P.O. Box 112 (Courthouse)
Lake Pleasant, NY 12108

HERKIMER
315-866-7920

Cooperative Extension
107 Court St.
Herkimer, NY 13350

JEFFERSON
315-788-8450

Cooperative Extension
223 J.B. Wise Place
Watertown, NY 13601

LEWIS
315-376-6551

Cooperative Extension
Post Office Box 72
5229 Dayan St.
Lowville, NY 13367

LIVINGSTON
716-658-2131

Cooperative Extension
158 South Main Street
Mount Morris, NY 14510

MADISON
315-684-3001

Cooperative Extension
Farm and Home Center
Eaton Street, P.O. Box T
Morrisville, NY 13408

MONROE
716-461-1000

Cooperative Extension
Cooperative Extension Center
249 Highland Avenue
Rochester, NY 14620

MONTGOMERY
518-853-3471

Cooperative Extension
Old Court House
Fonda, NY 12068

NASSAU
516-454-0900

Cooperative Extension
Plainview Complex—Bldg. J.
1425 Old Country Road
Plainview, NY 11803

NIAGARA
716-433-6773

Cooperative Extension
Farm and Home Center
4487 Lake Avenue
Lockport, NY 14094

ONEIDA
315-736-3394

Cooperative Extension
R.R. #1, Box 126
2nd Street
Oriskany, NY 13424-9998

ONONDAGA
315-424-9485

Cooperative Extension
Cooperative Extension Center
1050 West Genesee Street
Syracuse, NY 13204

ONTARIO 716-394-3977	Cooperative Extension Cooperative Extension Center 480 North Main Street Canandaigua, NY 14424
ORANGE 914-343-5979	Cooperative Extension Farm and Home Center 239 Wisner Avenue Middletown, NY 10940
ORLEANS 716-589-5561	Cooperative Extension P.O. Box 150 20 S. Main St. Albion, NY 14411
OSWEGO 315-963-7286	Cooperative Extension Cooperative Extension Headquarters Main Street Mexico, NY 13114
OTSEGO 607-547-2536	Cooperative Extension 123 Lake Street Cooperstown, NY 13326
PUTNAM 914-628-0454	Cooperative Extension 179 East Lake Boulevard Mahopac, NY 10541
RENSSELAER 518-270-4000	Cooperative Extension County Court House Congress and 2nd Sts. Troy, NY 12180
ROCKLAND 914-638-5500	Cooperative Extension 62 Old Middletown Road New City, NY 10956-2737
ST. LAWRENCE 315-379-2311	Cooperative Extension University Shopping Center 125 Main St. East Canton, NY 13617
SARATOGA 518-885-8995	Cooperative Extension 50 West High Street Ballston Spa, NY 12020
SCHENECTADY 518-372-1622	Cooperative Extension 615 State St. Schenectady, NY 12305
SCHOHARIE 518-234-4303	Cooperative Extension 41 South Grand Street Cobleskill, NY 12043
SCHUYLER 607-535-7466	Cooperative Extension Rural-Urban Center 208 Broadway Montour Falls, NY 14865
SENECA 315-539-9254	Cooperative Extension Farm, Home and 4-H Center 321 East Williams Street Waterloo, NY 13165
STEUBEN 607-776-7666	Cooperative Extension County Office Building 119 East Steuben St. Bath, NY 14810
SUFFOLK 516-727-7850	Cooperative Extension 246 Griffing Avenue Riverhead, NY 11901
SULLIVAN 914-292-5250	Cooperative Extension P.O. Box 191 (59 N. Main St.) Liberty, NY 12754
TIOGA 607-687-4020	Cooperative Extension 56 Main Street Owego, NY 13827
TOMPKINS 607-272-2292	Cooperative Extension Cooperative Extension Center 225 South Fulton Street Ithaca, NY 14850
ULSTER 914-338-3494	Cooperative Extension Extension Headquarters P.O. Box 3545 (74 John St.) Kingston, NY 12401
WARREN 518-623-3291	Cooperative Extension Schroon River Road HCR 02, Box 23B Warrensburg, NY 12885
WASHINGTON 518-747-2861	Cooperative Extension County Office Building Annex Lower Main Street Hudson Falls, NY 12839
WAYNE 315-483-6918	Cooperative Extension P.O. Box 217 (County Rd. 143 and Rt. 14N) Alton, NY 14413
WESTCHESTER 914-682-3074	Cooperative Extension 214 Central Avenue White Plains, NY 10606
WYOMING 716-786-2251	Cooperative Extension 401 North Main Street Warsaw, NY 14569
YATES 315-536-3381	Cooperative Extension County Office Building 110 Court Street Penn Yan, NY 14527

New York Offices of Cornell Cooperative Extension, including Expanded Food and Nutrition Program sites (EFNEP):

Administrative Office 213-340-2900	Cornell Cooperative Extension 15 East 26th St., 5th Floor New York, NY 10010-11565
Brooklyn Center 718-237-0920	100 Clinton Street, 2nd Floor Brooklyn, NY 11201-4203
Bedford Stuyvesant EFNEP 212-783-2722	Stark Bldg., 5th Floor 1360 Fulton Street Brooklyn, NY 11216-2606
Bronx EFNEP 212-583-7770	2021 Grand Concourse, Room 602 Bronx, NY 10453-4317
Brownsville EFNEP 718-385-0233	444 Hopkinson Ave., 1st Floor Brooklyn, NY 11212-1542
Lower East Side EFNEP 212-260-6300	107 Suffolk, Rm. 210 New York, NY 10002-3305
Queens EFNEP 212-526-3490	161-10 Jamaica Avenue, Room 216 Jamaica, NY 11432-6149
Staten Island EFNEP 718-447-2600	28 Bay Street Staten Island, NY 10301-2511
Upper Manhattan EFNEP 212-923-2400	4250 Broadway, Room 7 New York, NY 10033-3708

Appendix 2

Dairy Council Offices in New York State

Dairy, Food, and Nutrition Council

Syracuse (315) 475-2721,
Headquarters
(counties served: Cayuga, Cortland, Hamilton, Herkimer, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, Seneca, St. Lawrence)
472 South Salina Street, Suite 101
Syracuse, NY 13202-2401

Arkport (607) 295-7222
(counties served: Allegany, Cattaraugus, Steuben)
R.D. #1, Box 220A
Ellis Hill Road
Arkport, NY 14807

Binghamton (607) 724-7598
(counties served: Broome, Chemung, Chenango, Delaware, Otsego, Schuyler, Tioga, Tompkins, Yates)
834 Front Street
Binghamton, NY 13905

Latham (518) 785-5441
(counties served: Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington)
Commerce Building
678 Troy-Schenectady Road
Latham, NY 12110

Poughkeepsie (914) 452-5630
(counties served: Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster)
316 Main Mall
Poughkeepsie, NY 12601

Dairy Council of Niagara Frontier Area (716) 634-1080
(counties served: Erie, Genesee, Niagara, Orleans, Wyoming)
2451 Wehrle Drive
Buffalo, NY 14221

Dairy Council of Metropolitan New York (212) 682-7961
(counties/boroughs served: Bronx, Brooklyn, Manhattan, Queens, Staten Island, Nassau, Suffolk, Westchester)
60 East 42nd Street, Room 2446
New York, NY 10165

Dairy Council of Rochester Area (716) 461-2880
(counties served: Livingston, Wayne, Monroe, Ontario)
Carnegie Place
247 No. Goodman
Rochester, NY 14607

Dairy and Nutrition Council, Mideast (814) 868-1714
(county served: Chautauqua)
Park Place, Suite 11
1545 W. 38th Street
Erie, PA 16508

Health and Nutrition Regional Network

Coordinator	Geographic Area Served
Regional Health and Nutrition Coordinator St. Lawrence-Lewis County BOCES A. A. Kingston Middle School Potsdam, NY 13676	Region I: Counties of Allegany, Cattaraugus, Cayuga, Chautauqua, Clinton, Erie, Essex, Franklin, Genesee, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, St. Lawrence, Seneca, Wayne, Wyoming, Yates
Regional Health and Nutrition Coordinator Ulster County BOCES 175 Route 32 North New Paltz, NY 12561	Region II: Counties of Albany, Broome, Chemung, Chenango, Columbia, Cortland, Delaware, Dutchess, Fulton, Greene, Montgomery, Orange, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Westchester
Regional Health and Nutrition Coordinator Suffolk 3 BOCES Long Acre School Sarina Drive Commack, NY 11725	Region III: Counties of Nassau and Suffolk and New York City (five boroughs)

Food Banks in New York State

Community Food Center of Western New York
701 Seneca Street
Buffalo, New York 14210
716-852-1305

Genesee Valley Regional Food Clearinghouse
810 Emerson Street
Rochester, New York 14609
716-647-3400

The Food Bank of Central New York
555 Stewart Drive West
Hancock Field
Syracuse, New York 13212
315-458-1554

Southern Tier Food Bank
Office of Social Ministries
160 High Street
Elmira, New York 14901
607-734-9784

Northeastern New York Food Bank
Room 202 Central Warehouse
Colonie and Montgomery Streets
Albany, New York 12202
518-463-3544

Long Island Regional Food Bank
Pilgrim Psychiatric Center
P.O. Box 1073
West Brentwood, New York 11717
516-435-0450

Food for Survival Food Bank
Hunts Point Co-op Market
Building F
Bronx, New York 10474
212-991-4300

A Case of Waste

Level 6

Work Sheets, Information Sheets, Letter to Parents
New York State
Revised Edition

NUTRITION COMES ALIVE

SP 028 336

Nutrition Comes Alive

Level 6
A Case of Waste

Work Sheets, Information Sheets, Letter to Parents

Written and Revised by
Tracy J. Farrell

Division of Nutritional Sciences, a division of the New York State College of Human Ecology and the New York State College of Agriculture and Life Sciences, Cornell University, Ithaca, New York 14853. 1986.

Work Sheets, Information Sheets, Letter to Parents

Work Sheets, Information Sheets, Letter to Parents	Letter Code
For Section 1	
What Do You Think?	A
Trash Tells a Tale	B
Letter to Parents	C
School Waste Study	D
School Waste Data	E
Foods Thrown Away	F
Home Waste Study	G
Waste Mini-Investigation	H
Foods and Nutrients	I
Likes and Dislikes	J
Energy Balance	K
For Section 2	
Where the Energy Goes	L
New York State Map	M
New York State Agriculture	N
Food Packaging	O
Are You an Energy Saver?	P
Food and Energy	Q
For Section 3	
Garbage Takes Over	R
A Mini-Landfill	S
Deposit Laws	T
Chicken Hot Dogs	U
A New Use	V
Stale Bread Experiment	W

For Activities 1 and 7 **A**

Name _____ **Date** _____

What Do You Think?

Below are some statements that people have made about throwing away food and food containers. Three possible responses are listed below each statement. Circle the response that best indicates your opinion about each statement.

1. It doesn't matter if I eat my food because there is always enough for everybody.

   Agree Neutral Disagree

2. I don't waste food.

   Agree Neutral Disagree

3. I usually throw away some of my lunch so that I can get outside faster.

   Agree Neutral Disagree

4. Sometimes I eat more food than I really want or need just so that I won't waste it.

   Agree Neutral Disagree

5. The cafeteria doesn't serve food that students like.

   Agree Neutral Disagree

6. Leftovers are garbage anyway.

   Agree Neutral Disagree

7. If restaurants gave people smaller helpings, less food would be thrown away.

   Agree Neutral Disagree

8. Using returnable bottles helps protect our environment.

   Agree Neutral Disagree

9. I paid for the food, so it's OK if I throw it away.

   Agree Neutral Disagree

10. It would be interesting to learn more about food waste in school.

    Agree Neutral Disagree

Nutrition Comes Alive, Level 6, A Case of Waste. Developed by the Division of Nutritional Sciences, Cornell University, 1986.

Name _____ Date _____

Trash Tells a Tale

Do you know that we spend three times as much money to get rid of garbage each year as we spend on medical research? And that we in the United States generate 70 percent of the world's solid wastes, even though we have only 6 percent of the world's population? How can this be true?

Can it be that some of our waste shouldn't be garbage? Can it be that some of what we're calling garbage is really good food thrown away?

Some facts about trash were first discovered through the "garbage project" at the University of Arizona in Tucson. As an exercise in archaeological research, students examined the remains of last week's home life. With help from the Tucson Sanitation Department, students picked over bags of refuse from randomly selected households in different sections of the city and recorded their findings.

The amount of food waste was shocking. The average household in the sample was throwing away between 7 and 10 percent of the food it bought. If you add the amount discarded down the kitchen disposal, the figures would be greater, 9 to 15 percent.

In examining the garbage, researchers found large chunks of food, not just plate scrapings. More than 50 percent of the individual food items weighed more than a half ounce, termed "straight waste."

Nutrition Comes Alive, Level 6, A Case of Waste. Developed by the Division of Nutritional Sciences, Cornell University, 1986.

The garbage project at the University of Arizona appealed to many younger students as well. A sixth grade class at Point School in New Hartford, New York, conducted a two-day survey of bag and hot lunch leftovers. Students collected and recorded all the waste from bag and hot lunches.

When they collected all the milk that wasn't used, they were amazed by the amount of leftover milk they had to pour down the drain.

The students also conducted interviews to find out why people throw away food. Then they made a videotape and slides of their project to show to their parents and to other students and teachers.

As a result of their classroom activities, New York and Arizona students reached the same conclusion. They were throwing away significant amounts of good food.

If you checked the food waste in your school, would your conclusions be the same? If you looked in the refuse of your own home or community, what would you find? Would you find garbage, or would it be good food thrown away?

Nutrition Comes Alive, Level 6, A Case of Waste. Developed by the Division of Nutritional Sciences, Cornell University, 1986.

Dear Parents,

Take a minute to think about what has gone into the wastebaskets in our community today—papers, packaging of all kinds, and food. With today's technology, throwing things away seems to be an inevitable part of daily living. But is it? Is it necessary, as a study in Tucson showed, for us to discard between 7 and 15 percent of the food we buy? Can we change this pattern?

At the very least, food waste means a loss of money, nutrients, and energy. Energy is lost in two ways—as food energy or calories provided by food, and as fuel energy used to grow, harvest, process, transport, and package the food. When good food is discarded, all of this energy is lost. Furthermore, additional energy is needed to dispose of the food, and the disposal process may have negative environmental effects.

There is another aspect of food waste to consider. It is clearly wasteful to throw away edible food, but it is also wasteful to eat more than we need for energy and health. The excess calories consumed will be stored as surplus body fat, unneeded and unhealthy. Therefore, eating food that we do not want or need is not a good solution to the problem of food waste.

What can we do about food waste? We can begin by finding out how much food we waste and why. Studies have shown that we may not be conscious of how much food we throw away. Learning the facts about food waste may help us to formulate solutions to the problem.

During the next few weeks, our class will be exploring many different aspects of food waste. Collecting information on food waste in school, at home, and in the community will provide a multitude of interdisciplinary learning experiences, which will help motivate all of us to conserve food and food-related resources.

Our unit on food waste will involve some "hands-on" explorations of food waste in school and at home. We will concentrate on school and home because they are easily accessible, not because they represent extreme examples of food waste. You are welcome to participate in our explorations. We would also like your approval for your child to participate in the studies.

Please sign and return the permission slip so your child can participate in these exciting explorations.

Sincerely,

.....

_____ has my permission to study
(child's name)
food waste at school, at home, and in the community.

Signature _____

I would like to volunteer to help with the studies. _____yes _____no

Nutrition Comes Alive, Level 6, A Case of Waste. Developed by the Division of Nutritional Sciences, Cornell University, 1986.

Queridos Padres:

Piensen por un minuto sobre todo lo que va a parar a los zafacones en nuestra comunidad hoy día—periódicos, envolturas de todo tipo y comida. Debido a los actuales avances tecnológicos, el botar cosas parece ser una parte inevitable de nuestra rutina diaria. Pero, ¿tiene que ser así? ¿Es realmente necesario, de acuerdo con un estudio llevado a cabo en Tucson, que tengamos que desechar del 7 al 15% de los alimentos que compramos? ¿Podríamos cambiar este patrón de conducta?

Por lo menos, el desperdicio de alimentos significa pérdida en dinero, nutrientes y energía. Y la energía se pierde o desperdicia en dos formas—calorías que podrían obtenerse del alimento y el combustible que se utilizó en la operación de sembrar, cosechar, procesar, transportar y empacar los alimentos. Cuando se desecha comida o alimentos buenos, toda esta energía se pierde. También se necesita energía adicional para deshacerse de los desperdicios y este proceso podría tener impactos negativos en el ambiente.

Hay otro aspecto a considerar sobre el desperdicio de comida o alimentos. Está claro que es desperdicio botar comestibles, pero también es desperdicio comer más de lo que necesitamos para la energía y la salud. Las calorías extras que se consumen, se acumularán en el cuerpo como exceso de grasa; innecesaria y poco saludable. Por lo tanto, comer alimentos que no deseamos y que no necesitamos, no es una buena solución al problema del desperdicio de comida.

¿Qué podemos hacer, entonces, para evitar el desperdicio de comida? Podemos empezar por averiguar la cantidad de alimento que desperdiciamos y las razones. Por investigaciones sabemos que es posible que no estemos conscientes de la cantidad de alimentos que botamos. Darnos cuenta de este problema, podría ayudarnos a buscar soluciones.

En las próximas semanas exploraremos en clase varios aspectos relacionados con el desperdicio de alimentos. El proceso de recolectar información sobre cómo se desperdicia el alimento en la escuela, en la casa, y en la comunidad, proveerá un sinnúmero de experiencias buenas para aprender y practicar lo cual ayudaría a motivarnos a todos a conservar los alimentos y los recursos relacionados.

La unidad que brega con el tema del desperdicio de alimentos o comida, utilizará el enfoque de "manos a la obra" en la exploración de esta práctica tanto en la escuela como en el hogar. Concentraremos este esfuerzo en la escuela y en el hogar porque son fácilmente accesibles, no porque representen ejemplos serios de desperdicios de comida. Le invitamos a participar en nuestras investigaciones. También nos gustaría tener su aprobación para que su niño o niña participe en este estudio.

Por favor firme y devuelva la parte autorizando la participación de su niño o niña en este excitante proyecto.

Sinceramente,

— —

_____ tiene permiso para investigar el desperdicio
nombre del niño (a)

de comida o alimentos en la escuela, en el hogar, y en la comunidad.

firma _____

Me gustaría participar como voluntario (a). _____ _____
sí no

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D

For Activity 2

Name _____ Date _____

School Waste Study

You can organize a project to study food waste in your school. Use the following ideas to help organize your study.

Possible questions for the study

- What foods do students throw away?
- How much of each food do students throw away?
- What reasons are given for throwing food away?
- What are some ways to decrease food waste?

Materials and equipment

- Data sheets
- Plastic disposable gloves for handling food
- Two trash containers—one for food and one for other materials (optional)
- Several half-gallon or gallon milk containers to collect leftover milk (optional)
- Tape recorder, camera, and videotape (optional)
- Large scale to weigh food (optional, school nurses often have a scale)

Jobs to do

Form groups to work on each specific part of the project. Different groups might

- Weigh the total number of pounds of food thrown away
- Measure milk thrown away
- Observe and count servings of different foods thrown away
- Interview students
- Interview food-service staff
- Take pictures or make drawings of the study being conducted
- Report results to other groups

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Methods

- To find the total amount of milk and food thrown away:
  - —Ask people to give you their leftover milk when they clear their trays. Pour the milk into half-gallon or gallon containers. On the data sheet, record the number of containers filled.
  - —If you can use a large scale, ask people to separate all leftover food from other trash and to place it in a separate trash container. Weigh the empty trash container before lunch and weigh the full container after lunch. Subtract the weight of the empty container from the weight of the full container to determine how many pounds of food were thrown away. Record the information.
- To determine what foods are thrown away, look at the day's menu and fill out a data sheet with names of foods on the menu. Use extra spaces to record the contents of bag lunches. Then stand by the trash containers and observe which foods are thrown away. Estimate the amounts of foods thrown away and record the information using check marks.
- To learn why people don't eat their food, interview students and tape-record or write down their comments.
- To learn about another side of the problem, interview cafeteria workers. Ask whether any foods are thrown away in the kitchen and what happens to leftovers. Find out what government guidelines and requirements the cafeteria must follow when planning and preparing meals.
- Also talk to the custodial staff. They can tell you whether the results on the day of your survey were typical.

Results

You should now be able to answer your questions about food waste. Use the information gathered to make some suggestions about how to decrease food waste at school. You may present the results of your study in some of the following ways:

- Drawings, photographs
- Movies, videotapes
- Posters
- Graphs and charts
- Taped interviews
- Newspaper articles
- Letters
- Oral reports
- Class discussions

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E

For Activity 2

Name _____ **Date** _____

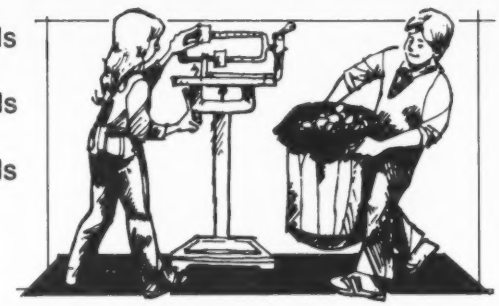
School Waste Data

Total Pounds of Food Thrown Away:

Weight of food trash container **after** lunch _____ pounds

Weight of food trash container **before** lunch – _____ pounds

Total weight of food thrown away = _____ pounds



Total Amount of Milk Thrown Away:

Number of half-gallon cartons filled with milk = _____ half-gallons
OR
Number of gallon cartons filled with milk = _____ gallons

Questions:

1. How many pounds of food were thrown away at lunch? _____

2. How many kilograms of food were thrown away at lunch? _____
   (1 kilogram = 2.2 pounds)

3. How many half-gallons of milk were thrown away at lunch? _____

4. How many gallons of milk were thrown away at lunch? _____

5. How many half-pints of milk were thrown away at lunch? _____
   (1 half-gallon = 2 quarts = 4 pints = 8 half-pints)

6. Figuring on 180 days of school per year, and using your findings as a typical day, how many pounds of food are thrown away at your school in one year? _____

7. How many tons of food are thrown away at your school in one year? _____

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For Activity 2

F

Name _____ Date _____

Foods Thrown Away

School Lunch Food	Whole Serving	More than 1/2 Serving	1/2 Serving or less
Bag Lunch Food			

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Name _____ Date _____

Home Waste Study

What foods are thrown away in your home? Why? Try to find out the answers. For one day, ask everyone in your family to place all discarded food, inedible food scraps (bones, egg shells, and the like), and food packaging in one plastic garbage bag, separate from other garbage. If you have a garbage disposal try not to use it for one day. Be sure to record any liquids, such as milk or soup, that are poured down the kitchen sink. At the end of the day examine the garbage and answer the following questions.

1. List all items that were thrown away. Try to tell why they were thrown away.

Items	**Why?**
Example: tuna fish	Spoiled in refrigerator

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2. Does your list contain more edible foods or inedible scraps?

3. What are some possible uses for any edible foods that were thrown away?

4. What happens to leftover food in your home?

5. How does your family define "food waste"?

6. How could you decrease food waste in your home? Ask different family members for their opinions.

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Name _____ Date _____

Waste Mini-Investigation

Grocery Store

Visit a local grocery store, talk with the manager, and observe the garbage from the store.

1. Does the store throw away any food? If so, what types? Why?
2. Is any food returned to food companies? Why? What happens to it?
3. Does any food spoil in the store? What happens to it?
4. Is any food given away? To whom?
5. How could waste be decreased?

Restaurant

Visit a local restaurant or snack bar. Talk with the owner and observe three tables after people finish eating.

1. What foods are thrown away? Why?
2. What packaging materials are thrown away?
3. Do people take any food home?
4. Does the restaurant serve smaller portions when requested?
5. What happens to extra food that is cooked and not served? Can it be given away?
6. How could waste be decreased?

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Home

Record all food items thrown away in your home for two days. (Remember to include foods ground in the garbage disposal.)

1. What foods or inedible food scraps are thrown away?

2. What food packaging materials are thrown away?

3. Why is food thrown away? Ask several family members for their opinions.

4. Did any food spoil before it was thrown away? Why?

5. How could waste be decreased?

School

Stand by a trash can in the cafeteria and record all the foods that ten people throw away.

1. Ask why they are throwing the foods away.

2. Which foods from the school lunch are thrown away? Why?

3. What foods from bag lunches are thrown away? Why?

Then talk to a food-service worker.

4. Are any foods thrown away in the kitchen? Why?

5. What happens to leftover food?

6. How could waste be decreased?

Other Places for Observation

City street, park or school yard, beach, hospital, factory, food cooperative, soup kitchen. Describe what you see.

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I

For Activities 4 and 5

Name _____ Date _____

Foods and Nutrients

Fruits

Good sources of carbohydrate, vitamin C, and fiber. Dark yellow fruits such as apricots also contain a lot of vitamin A.

Vegetables

Good sources of carbohydrate, vitamins A and C, fiber, and some iron. Leafy green vegetables (spinach, collards, kale) and broccoli also contain calcium.

Bread and Cereal

Good sources of carbohydrate, B vitamins, iron, and protein.

Milk and Milk Products

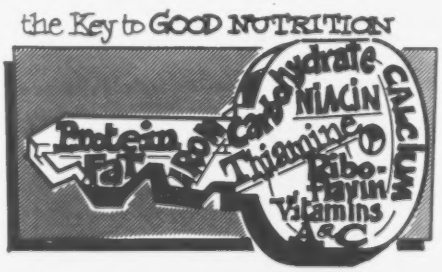
Good sources of calcium, protein, vitamins A and D, and riboflavin (a B vitamin). Whole milk products contain fat.

Beans, Nuts, Meat, Eggs

Good sources of protein, iron, and B vitamins. Meat, eggs, and nuts contain fat.

10 Key Nutrients

Carbohydrate	Thiamin (B_1)
Protein	Riboflavin (B_2)
Fat	Niacin
Vitamin A	Iron
Vitamin C	Calcium



For more information on specific nutrients and their functions see ***The Nutrient Connection,*** Level 5 of **Nutrition Comes Alive.**

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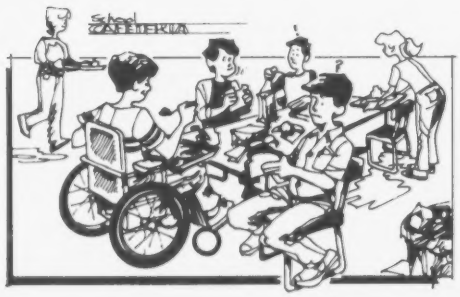
For Activity 5

J

Name _____ **Date** _____

Likes and Dislikes



Make an X in a column to indicate your opinion about each food.

Food	Like and Eat	Like But Don't Eat	Don't Like But Eat Sometimes	Don't Like and Very Seldom/ Never Eat
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

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Name _____ Date _____

Energy Balance

Why do you need energy? You need energy to grow, to breathe, to eat, to run, to fill out work sheets.

Human energy is measured in kilocalories or Calories. The number of Calories that you need depends on many things, including how active you are. Active people need more Calories than inactive people.

Food energy is also measured in Calories, and foods contain different amounts of Calories. For example, a slice of cake contains more Calories than a slice of bread. It is important to balance the body's needs with the energy provided by foods. If you eat more Calories than you need for energy and growth, your body will store the extra Calories as fat. Storing too many food Calories as unhealthy, excess fat may be considered food waste.

Fill in the blanks on the following chart to show how many Calories your body uses during different activities.

Calories Used by a Sixth Grader

Activity	1 minute	10 minutes	30 minutes	60 minutes
Sitting	.6 C	_____	18 C	_____
Walking	2.4 C	24 C	_____	144 C
Fast Dancing	5.0 C	_____	150 C	300 C
Running	5.8 C	58 C	174 C	_____

Calories in Different Snacks

1 celery stalk	5 C
1 carrot	21 C
1 cup skim milk	80 C
1 apple	80 C
10 potato chips	115 C
20 peanuts	120 C
1 chocolate bar	240 C
1 cheeseburger	350 C

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Questions

1. If you sit for 60 minutes, what snacks could you choose that provide less than the number of Calories used while sitting?

   _____

2. If you eat 1 apple how many minutes will it take your body to use those Calories while sitting? while fast dancing?

   _____

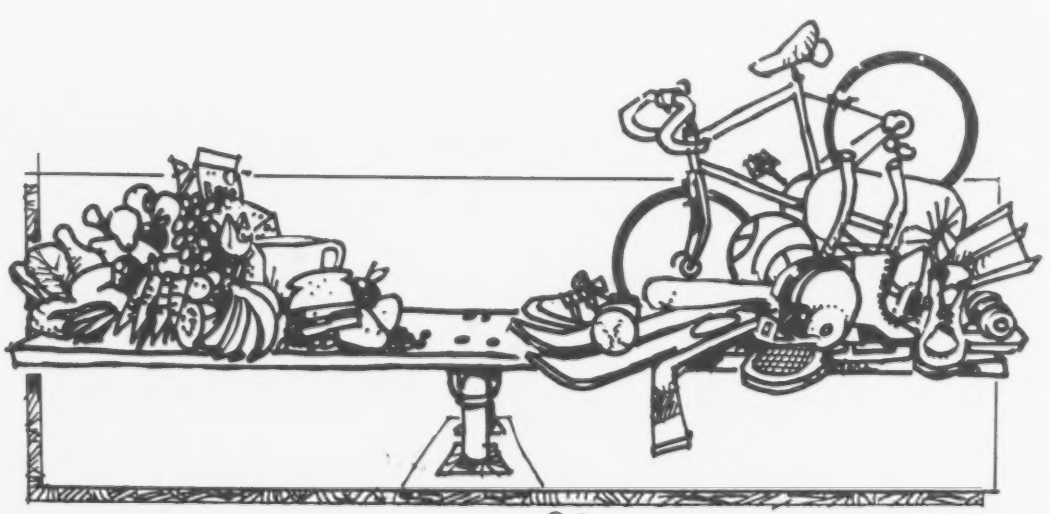
3. If you eat 1 chocolate bar instead of 20 peanuts, how many more minutes will you have to run to use up the additional Calories?

   _____

4. Which individual food(s) would give you enough energy to walk for 45 minutes?

   _____

5. Now, make up two more story problems of your own using the information on this work sheet.



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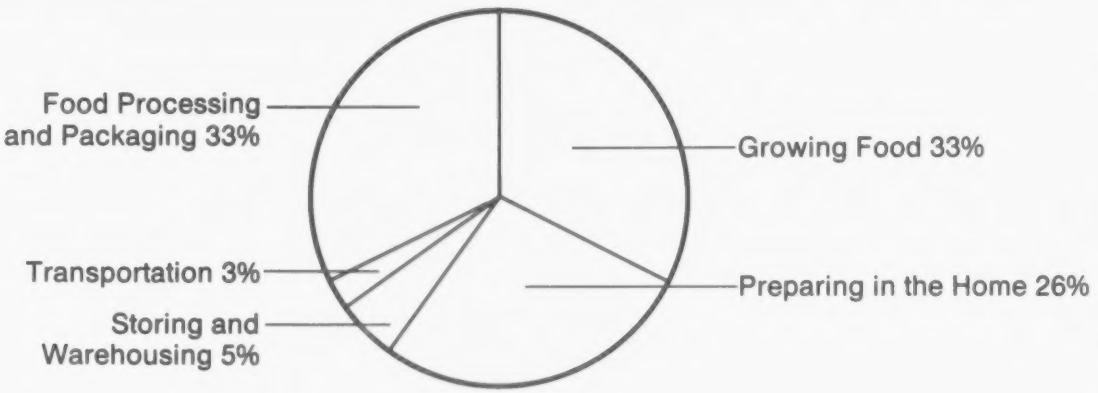
Name _____ Date _____

Where the Energy Goes

All stages of food production and preparation require energy. Energy is needed to grow and harvest food, process it, package it, move it from place to place, and keep it fresh in warehouses and stores. Energy is also used at home to refrigerate, cook, and prepare food.

The pie graph below shows the relative amounts of energy needed for each stage of food production and preparation. The larger the slice of the pie, the more energy is used. The percentages are averages. Specific foods may require more or less energy for each stage.



Create a bar graph giving the same information as in the pie graph.

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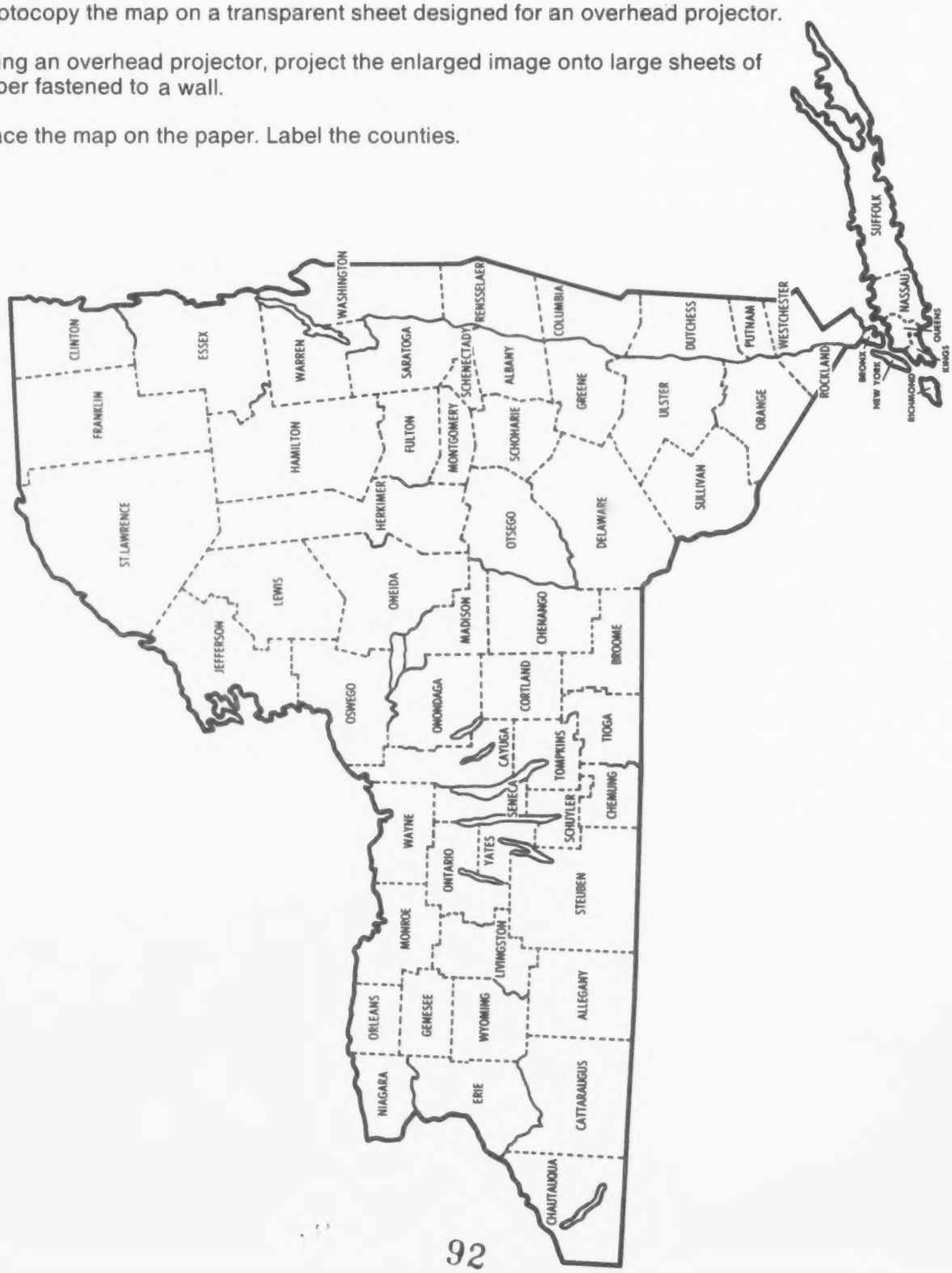
For Activity 10

M

To make a large map:

1. Photocopy the map on a transparent sheet designed for an overhead projector.
2. Using an overhead projector, project the enlarged image onto large sheets of paper fastened to a wall.
3. Trace the map on the paper. Label the counties.



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New York State Agriculture

New York has the second largest population of any state in the United States. It has many large cities and many different industries. Agriculture also is very important in New York State. The following list shows some of the important food products that are grown in New York State and where they are grown in large quantities.

Product	County or Area Where Grown in Large Quantities
Apples	Widespread, but especially grown in Clinton, Monroe, Niagara, Orleans, Wayne, Columbia, Dutchess, Ulster, and Orange counties
Carrots	Yates County
Cauliflower	Erie, Delaware, Monroe, Onondaga, and Suffolk counties
Celery	Orange, Oswego, and Wayne counties
Cherries	Chautauqua, Columbia, Monroe, Niagara, Orleans, Schuyler, Ulster, and Wayne counties
Dairy Products	Generally throughout the state, but there are many dairy farms in Cattaraugus, Cayuga, Chautauqua, Chenango, Cortland, Delaware, Herkimer, Jefferson, Lewis, Madison, Oneida, Otsego, St. Lawrence, Steuben, Washington, and Wyoming counties
Dried Beans	Cayuga, Genesee, Livingston, Monroe, Ontario, Orleans, and Wayne counties
Eggs	Widespread, but many farms in Sullivan, Allegany, Cayuga, Chenango, Erie, and Wayne counties
Grapes	Erie, Chautauqua, Yates, Steuben, Schuyler, Ontario, Cattaraugus, Columbia, Niagara, Seneca, and Wayne counties
Lettuce	Orange and Oswego counties
Maple Syrup	Schoharie County
Onions	Orange, Oswego, Orleans, Genesee, and Madison counties
Pears	Columbia, Dutchess, Monroe, Niagara, Orange, Orleans, Oswego, Ulster, and Wayne counties
Potatoes	Suffolk, Steuben, Wayne, Wyoming, Oswego, Orleans, Cayuga, Erie, Franklin, Genesee, Livingston, Madison, Monroe, and Oneida counties
Snap Beans	Cayuga, Erie, Genesee, Monroe, Oneida, Orleans, Wayne, and Yates counties
Sweet Corn	Cayuga, Dutchess, Erie, Genesee, Livingston, Monroe, Ontario, Orleans, Suffolk, Ulster, Wayne, and Yates counties
Tomatoes	Albany, Chautauqua, Erie, Monroe, Niagara, Onondaga, Orange, Orleans, and Suffolk counties

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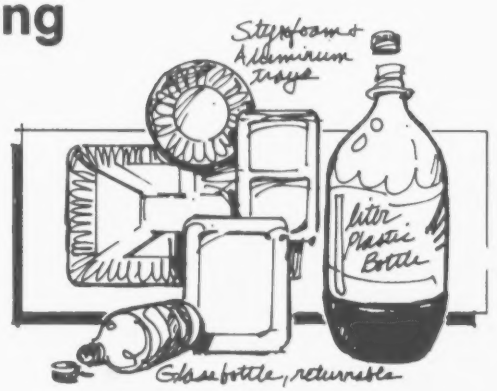
Name _____ **Date** _____

Food Packaging



Food is sold in many different packages. Materials and energy are needed to make all the packages. Look at home or in a grocery store to find foods in different packages and containers. Give one or two examples of foods that are sold in each type of container listed below. Read the label to try to find out how much energy, or Calories, each of the foods provides.

Container	Energy (Calories) to Produce Container*	Food	Energy (Calories) Provided by Food in Container
Small styrofoam tray	215 Calories		
Small cardboard tray	384 Calories		
Plastic bag, 16 oz.	559 Calories		
Small cardboard box	722 Calories		
Large cardboard box	750 Calories		
Steel can, 16 oz.	1006 Calories		
Glass jar, 16 oz.	1023 Calories		
Small aluminum tray	1496 Calories		
Aluminum can, 12 oz.	1643 Calories		
Plastic milk container, 1/2 gal.	2159 Calories		
Glass bottle, returnable, 16 oz.	2451 Calories		
Plastic bottle, 1 liter	2600 Calories (average)		

Library Research

Choose one type of container. Look in encyclopedias to find out how it is made. What form of energy is used to make it? Can it be recycled after it is used?

*Information from D. and M. Pimentel, ***Food, Energy, and Society*** (London: Edward Arnold Ltd., 1979).

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For Activity 12

Name _____ Date _____

Are You an Energy Saver?

Read and answer each question below.

1. When you bake cookies, do you set a timer and avoid peeking at them until the timer rings?

   Always Sometimes Never

2. Before you cook, do you use cold rather than hot water to wash your hands?

   Always Sometimes Never

3. Do you make toast in a toaster rather than under the broiler of a full-size oven?

   Always Sometimes Never

4. Do you wait to turn on the dishwasher until it is full?

   Always Sometimes Never

5. Do you decide what you want to eat before you open the refrigerator door?

   Always Sometimes Never

6. Do you tightly cover all leftover food before putting it in the refrigerator?

   Always Sometimes Never

7. If there are only two or three ice cubes left in a tray, do you put them back in the freezer rather than throwing them away?

   Always Sometimes Never

8. Do you warm up leftover stews or casseroles on stove burners rather than in the oven?

   Always Sometimes Never

9. When washing dishes by hand, do you rinse them in a pan of hot water rather than under a constantly running stream of hot water?

   Always Sometimes Never

10. Do you defrost frozen food in the refrigerator rather than on the counter?

    Always Sometimes Never

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Name _____ **Date** _____

Food and Energy

Read the following statements. Then mark each one T for true or F for false.

_____ 1. The sun is the ultimate source of all our food energy.

_____ 2. More energy is needed to produce fresh corn than a pork chop.

_____ 3. We eat most of our food just as it comes from the field.

_____ 4. Frozen french fried potatoes take less energy to produce than whole fresh potatoes.

_____ 5. Canning or freezing green beans helps keep them from spoiling.

_____ 6. Pineapples and bananas are grown in many areas of New York State.

_____ 7. More energy is needed to make a steel can than an aluminum can.

_____ 8. Choosing to eat New York-grown apples saves the energy that would be needed to transport apples from another state.

_____ 9. To save energy at home, we should decide what we are looking for before we open the refrigerator door.

_____ 10. Some of the steps in the extended or man-made food chain include food processing and packaging.

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Name _____ Date _____

The City Gazette

February 10, 1968

Garbage Takes Over

Huge heaps of garbage are turning all of New York City into an ugly, reeking dump. The sanitation workers' strike, which at first seemed only a nuisance, has become a crisis. After seven days of the strike, approximately 77,000 tons of uncollected garbage line sidewalks and block doorways. Rats boldly scurry through the refuse, and some people set fire to it. Fearing a possible outbreak of typhoid or other illnesses, public health officials have declared a general health emergency, the first since an outbreak of polio in 1931.

The sanitation workers began striking when their demands for pay increases were not met by the city. Negotiations for a settlement continue between Mayor John Lindsay and the Uniformed Sanitationmen's Association. Meanwhile, 8,000,000 New York residents are becoming increasingly irate because their city looks and smells like a garbage dump.

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Questions:

1. What was the average number of tons of garbage that piled up each day?

   _____

2. There are 2,000 pounds in 1 ton. How many pounds of garbage piled up each day?

   _____

3. The strike lasted for two more days. If garbage continued to pile up at the same rate, about how many tons of garbage were on the streets when the strike ended?

   _____

4. An average-sized garbage truck collects 6 tons of garbage in one load. How many garbage truck loads did it take to clean up the garbage when the strike ended?

   _____

5. If you had lived in New York City during the garbage strike, how could you have decreased the amount of food in the garbage? List some ideas.

"Brain twister"

6. During the strike, how many pounds of garbage did an average resident of New York produce each day?

   _____

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S

For Activity 15

Name _____ Date _____

A Mini-Landfill

Did you know that hogs used to act as garbage disposals in New York City? Long ago there were no garbage trucks or city dumps. In the 1700s people threw their garbage out of their houses into the streets. Hogs roamed the streets eating garbage.

Times have changed. Today several common methods are used to dispose of garbage. They range from burning garbage to burying it in sanitary landfills. Sanitary landfills are less harmful to the environment than many other methods. Follow the directions below to make your own mini-landfill.

Materials:

Large glass or plastic jars

Different pieces of garbage to bury (small food scraps, bones, metals, cardboard, paper, plastic)

Dirt (not sterilized potting soil)

Spoon or scoop

Water

Plastic wrap

Procedure:

1. Fill the jar about half full of dirt. Add 4 or 5 different pieces of garbage. Keep a list of all the things you put in.

2. Cover the garbage with more dirt. Sprinkle the dirt with water and cover the top of the jar with plastic wrap.

3. Place the jar in a warm place for about ten days.

4. Then empty the contents of the jar onto a newspaper and examine the bits of garbage. Record any changes that you see.

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Types of Garbage (date:)	Changes Observed (date:)
1.	
2.	
3.	
4.	
5.	

Questions:

Based on your observations, which materials do you think would naturally decompose and turn into dirt? Which would not?

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T

For Activity 16

Name _____ Date _____

Deposit Laws

On September 12, 1983, New York became the ninth state to require customers to pay a deposit on all soft drink and beer containers. Eight other states—Oregon, Vermont, Maine, Michigan, Iowa, Connecticut, Delaware, and Massachusetts—have similar laws.

Passage of the laws was quite controversial. Many people supported the proposed laws as a way to reduce litter, to decrease the amount of garbage that enters our landfills and garbage facilities, and to conserve energy. Opponents of the laws feared that consumers would have to pay more for beverages, that stores would have to spend more than they would be reimbursed for handling the containers, and that many bottle and can manufacturers would lose their jobs.

Two studies were done in New York one year after the law was passed.* Some conclusions of the studies are summarized below:

Litter—Beverage container litter has decreased by about 70 percent. But because beverage containers make up less than 20 percent of total litter, there has been a much smaller reduction in overall litter.

Return Rates and Recycling—Consumers are returning about 86 percent of their beer and 71 percent of their soft drink containers. More containers are returned in upstate than in downstate areas. Many more tons of glass, aluminum, steel, and even plastic are being recycled since passage of the law. But because larger quantities of materials are being recycled, prices paid for the materials have decreased.

Volume of Garbage—Because more containers are being recycled rather than thrown away, New York now has 3–5 percent fewer tons of garbage to dispose of each month and thus requires 5–8 percent less space in landfills.

*"The New York Returnable Beverage Container Law: The First Year," Report of the Nelson A. Rockefeller Institute of Government to the Temporary State Commission on Returnable Beverage Containers, March 15, 1985, and "Economic Effects of the New York Returnable Container Law on Soft Drink Bottlers," New York State Drink Association, prepared by Temple, Barker, Sloane, Inc., February 7, 1985.

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Prices—During the first year of the law, prices rose about 18 percent for beer and 10 percent for soda. Much of the increase might have been caused by such initial costs as changing labels and arranging systems for collection of containers. Prices may decrease in the future.

Change in Containers—Because of the law, soft drink manufacturers are using more plastic bottles because they weigh less and are easier to transport than glass bottles. Plastic is not easily recycled, but because the prices paid for recycled glass have dropped, the incentive to use nonrefillable glass bottles has decreased. Beer manufacturers, on the other hand, are using more aluminum cans and refillable glass bottles, which are readily recycled or reused.

Handling Costs—Retail stores are paid a 1.5¢ "handling fee" for each empty container, although the actual handling costs are about 2.6¢ per container.

Jobs—There has been a major reduction in jobs in the glass industry and some decline in jobs in the can industry. More jobs are available in the plastic bottling industry, and many new jobs have been created to transport and handle the empty containers. Overall, about 4,000 new jobs have been gained since passage of the law.

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Chicken Hot Dogs

Do you like to eat chicken or turkey backs and necks? These parts are not among most people's favorites. But do you like hot dogs? The backs and necks from chickens and turkeys are sometimes made into hot dogs. Before a process was invented to turn them into hot dogs, these parts were often thrown away. Now they can be made into tasty hot dogs so that nutritious food is not wasted.

Try to solve the following problems about chicken hot dogs.

1. One chicken neck has about 22 grams of meat. One chicken hot dog contains about 36 grams of chicken meat. How many chicken necks does it take to make 1 hot dog?

_____

2. A whole chicken back has about 84 grams of meat. How many chicken hot dogs can be made from two chicken backs?

_____

3. Each chicken has a neck with 22 grams of meat and a back with 84 grams of meat. How many chicken hot dogs can be made from the meat of 1 chicken back and 1 neck?

_____

4. A kilogram of chicken meat can be made into 1.25 kilograms of chicken hot dogs. Each hot dog weighs 45 grams. How many hot dogs can be made from 1 kilogram of chicken meat?

_____

5. A chicken hot dog contains about 6 grams of protein. How many grams of protein would the chicken hot dogs from question 4 provide?

_____

6. The meat from 1 chicken neck contains about 6 grams of protein. If a family eats chicken once a week and throws away the neck each time, how many grams of protein are thrown away in 1 year?

_____

7. The Recommended Dietary Allowance of protein for a sixth grader is about 45 grams per day. How many days worth of protein would the amount of protein from question 6 provide for a sixth grader?

_____

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A New Use

What would you do with more than 2,000 quarts of tasty and nutritious—but brown—grapefruit juice? Or almost two million pounds of a wholesome cereal that no one will buy? Why not have the food delivered free to needy people across the country? That's what two major food companies did when faced with these problems. They contacted Second Harvest, a relatively new nonprofit organization that coordinates a national network of food banks.

Such donations by food companies save only a tiny portion of the estimated 137 million tons of food that goes to waste each year in the United States. But they show the value of food banks. Although a bank, as defined by Webster's dictionary, is a "storage place for reserve supply," food banks try to do as little storage as possible. Instead, they want to disperse food rapidly to people who need it before it becomes inedible.

Food banks distribute the foods they receive to community charities. The charities, such as shelters for the homeless, rehabilitation facilities, and senior citizen centers, use the foods for on-site meal programs and emergency food programs. More than 20,000 charities in the United States now receive surplus foods channeled through food banks.

Food banks are nonprofit organizations, and donors are allowed to deduct the value of their donations from their taxes. Donors may deduct their costs for manufacturing the foods plus one-half of the difference between their costs and the fair market value for any foods they give to food banks. Food retailers, wholesalers, processors, and agricultural producers are among the businesses that donate food to food banks.

Marian Cheslow of Nabisco Brands notes, "The high standards of manufacturing today breed waste. You can't sell an imperfect package, and many things can go awry during high-speed processing." Faulty packaging,

PHOTO BY ALLAN M. SHAPIRO

unreadable or crooked labels, and production overruns are frequent problems. Products that fail test marketing because of lack of consumer interest (as in the cereal mentioned earlier) are also surplus. And if recipes or labels change, the old food is pulled off the shelves, says Cheslow.

The food bank program alone cannot stop all food waste in the United States. Nor can food banking solve the problem of hunger in this country. The unpredictability of donations makes the program an impossible substitute for government food stamps. But the donated surplus foods can add good nutrition and variety to peoples' diets. And with continued close cooperation between the food and transportation industries, the food bank movement can begin to redirect the flood of food waste in a positive way.

Information adapted with permission from "Surplus Food for the Needy: New System That Works," ***Professional Nutrition-ist,*** Winter 1982.

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Stale Bread Experiment

A study of garbage in Tucson, Arizona, showed that between 5 and 10 percent by weight of each standard-sized loaf of bread that we buy is likely to end up in the garbage. To get an idea of how much bread we throw away, try this experiment:

Materials:

A scale

A loaf of bread

Procedure:

1. Weigh the loaf of bread. Weight = _____
2. Multiply the weight of the bread by 8% (.08) to find the average weight of bread that is thrown away.

   Weight x .08 = _____ Weight wasted
3. Open the loaf of bread and put slices on the scale until they equal the weight wasted. (You may need to cut slices in half to reach the correct weight.) How many slices did you need?

   Slices usually wasted = _____

Brain Twister:

How many slices of bread would probably be wasted from a loaf that weighs 500 grams and contains 15 slices?

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